THE IRON TRADE REVIEW

VOLUME XXXII. CLEVELAND, O. MAY 18, 1899. CHICAGO, ILL. NUMBER 20

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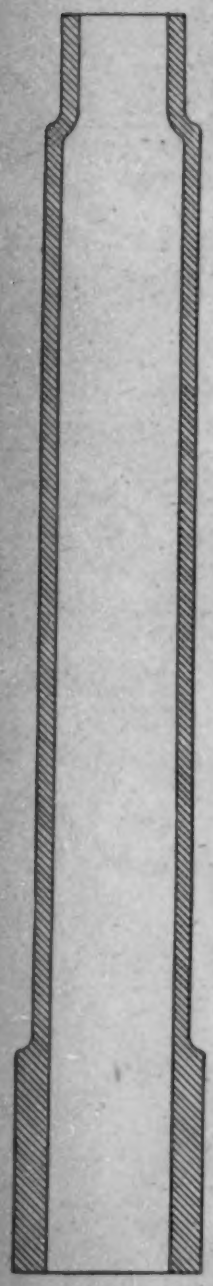

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THE IRON TRADE REVIEW

VOLUME XXXII. CLEVELAND, O. MAY 18, 1899. CHICAGO, ILL. NUMBER 20

THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

The week has given added testimony to the drift of affairs in the iron trade. Conditions are apparently growing more strained, so far as the pig iron market is concerned. Theoretically there has been support for the position taken by some members of the trade that continued additions to pig iron production, aided by the check put upon consumption by the high prices of all materials since the beginning of the year, would stop advances and start a decline. Practically the argument has come to naught, simply because the country continues to take more iron than is made. Returns show that stocks of coke and anthracite iron on May 1 were only 186,000 tons—a four or five days' supply. Adding charcoal stocks, the total was 262,000 tons, in addition to 86,000 tons in warrant yards, which fell to 76,000 tons on May 10. In April makers' stocks decreased 40,000 tons and warrant stocks 23,000 tons, while production increased 4,300 tons a week. There is increasing difficulty in supplying current wants of foundries; and as to the second half of the year, while no definite data are available, it is known that many furnaces have sold from 75 to 80 per cent of their product, while large requirements are yet to be provided for. The large sales of Southern forge in Pittsburg and the valleys advanced the price to $10.75 Birmingham on the last purchases and it has now been put at $11. Northern foundry iron has advanced 50 cents in the week and sales of No. 2 have been made at $15.50 furnace, while $16 has been asked and obtained this week in a few transactions. The Bessemer furnace owners, under further inquiry, have advanced the price from $15 to $16 in the valley, and in view of the amount of metal steel works will require, it is questioned if the supply will be adequate in the second half. A sale of 10,000 tons at $16 is reported. Time has made the situation in steel even more acute. Billets have sold at $27.25 Pittsburg, and it is evident that mills will be kept busy into the third quarter on contracts taken for second quarter delivery, nearly all being oversold. Two large buyers of steel, the American Steel & Wire Co. and the American Steel Hoop Co., have paid in the neighborhood of $25 for billets for the second half. While the trade at large has been watching narrowly for reliable indications of curtailment of consumption because of the high prices, no noteworthy development in this directions appears as yet. It is well understood that high prices will tell at length, but when? The fact that crops abroad are so plentiful that low prices for grain will rule at home, added to the certainty that railroads will have smaller crops to haul than in the past two years, will come back to the iron trade at length. Producers of structural shapes have kept their prices below their natural position relative to plates and bars, evidently that construction operations may not be sharply restricted; but an advance here is expected soon. The export trade has not suffered to the extent expected under high prices. English pig iron markets have been advancing rapidly, and after a slight decline there, the top figures again prevail. Sales of Southern pig iron for export to Continental points are reported this week at the highest price yet paid by Europe for American iron, and the demand continues. In consolidation lines the week has been uneventful. The Republic Iron & Steel Co. has completed its organization and established its offices at Chicago. Two or three mills in the list of properties included are reported to be still outside. The wrought pipe consolidation is nearly ready. It is understood that one Pittsburg plant, manufacturing iron pipe exclusively, will not be included. The promoters of the sheet mill consolidation have arranged with one Pittsburg district interest that has been counted on the outside.

PITTSBURG.

OFFICE OF *The Iron Trade Review and Industrial World.*
705 PUBLICATION BUILDING, May 17.

The decided movement toward still higher prices, first mentioned in last week's report, has gained further strength in the week under review, and sales in a number of lines have been made at prices considerably higher than any yet reached. Sales which have been made for specified delivery in the second half are far short of sufficient to put producers in the sold-up condition they find themselves; and the fact seems to be that there had been such yielding to temptation, when the present era of high prices began, that mills olds on top of orders which were really sufficient to run them during the first half, to such an extent that to wind up the year even they have not been in position to sell for the second half anything like an actual half-year's production. Producers who banked on lax specifications and cancellation of orders were wholly in error, the result being that a great deal of material sold for delivery in the first half will really be held over and delivered in the second half. This is of course no indication of weakness in the market, nor can any evidence of weakness be found on close scrutiny with actual conditions. During the boom of 1895 there was every belief, when the top notch was reached, that prices would be maintained, yet they suddenly collapsed. Now, on comparison, it can readily be seen that the present conditions are much stronger than those ruling at that time; but for all that there is a feeling that something will occur, at least before the end of the present year, and that prices will go lower. It is claimed that the present range cannot, in the very nature of things, be maintained; but for such thoughts those who are in control of the markets have no time. Considerable talk is being indulged in about efforts

to hold the market down, but this is talk and nothing more.

The week has been praticularly barren of news in regard to the large industrial combinations, and so far as the public is concerned matters are about as they were. The consolidation into one corporation of the lines controlled by the leading local interests has not yet been accomplished, but it doubtless will be, and the past week seems to have been occupied with matters relating to financing the deal. It is well understood that this work is being done by the Chicago parties, and an official statement may be expected from these sources at any time.

PIG IRON.—The total stocks in the valleys and in the Pittsburg district are estimated at not over 60,000 tons, indicating a heavy decrease in the past few weeks. The valley furnaces have been turning out an unusually large percentage of basic, gray forge, and foundry iron, and the scarcity of Bessemer pig has become more and more pronounced. The reports of efforts to keep down the price of Bessemer are no longer given serious consideration. Only 13,000 tons of the 25,000 tons mentioned last week as having been inquired for were taken at the price given, $15, but following the sale of 13,000 tons the price advanced and there have been sales at $15.50, and in the past two or three days, $16, valley, has been paid and the market is very firm at this, with talk of a further advance of a dollar a ton. Some little Pittsburg Bessemer is being quoted at higher than the proportionate price. In mill iron there has been considerable activity, and there has been no difficulty in effecting sales at $14.85, Pittsburg, while as high as $15 has been paid. A considerable tonnage of Southern gray forge has come into this market. In the valleys there has been considerable activity as well, and $14.50 to $14.75 is the market. In foundry iron the week has been rather quiet, but some occasional lots have been sold, mainly to those whose requirements are such that they pay a price above the market. Sales of No. 2 in odd cases have been made at $16 and even higher. We quote the market as follows:

Bessemer, valley furnace	$16.00	
Bessemer, Pittsburg	16 65	
No 1 Foundry	16.00 to	$16.25
No. 2 Foundry	15.75 to	16.00
No. 3 Foundry	15.25 to	15.75
Gray Forge, valley furnace	14.50 to	14 65
Gray Forge, Pittsburg	14 85 to	15 00

A sale of 4,000 tons of gray forge was made Tuesday at $15.40 delivered to Pittsburg consumer. Prompt delivery was specified and the transaction indicates the premium paid for spot iron.

STEEL.—The two leading buyers, the wire and hoop interests, have made some considerable purchases during the past fortnight, for delivery during the latter half of the year, and the tonnages involved permitted the securing of prices slightly lower than the general run of the market. The steel mills are so far behind in their deliveries, on account of having sold so heavily for the first half, and having no help in the way of cancellation of contracts or delay in specifications, and have a comparatively small tonnage for actual sale for the second half. It is claimed that some interests are now pretty well sold up for the entire year, but this must be taken with some grains of allowance. It is the fact, however, that prices have advanced, and that for ordinary lots very much higher prices have been secured. A number of sales of moderate lots have been made on the basis of $27.25, delivered Pittsburg, and this represents the market at present. There is considerable talk of still higher figures within the next week or so. Two or three lots of sheet bars have been sold at $30, but the available tonnage is so small that purchasers have the greatest difficulty in securing any supply.

FERRO-MANGANESE.—Domestic ferro is quoted unchanged at $75 for good sized lots.

RAILS AND TRACK MATERIAL.—There is no change to be noted in this line. Track material is very firm at the advanced prices of last week, as follows: Spikes, 1.90c to 2c; track bolts, 2.20c to 2.40c; splice bars, 1.50c to 1.70c; links and pins, 1.90c to 2c.

BARS.—Both steel and iron bars are very strong and selling has been heavy enough to force the price up to as high as 2 cents, at which figure there have been sales of small lots of steel bars this week. We quote the market for both steel bars at 1.90c to 2c, and for iron at 1.65c to 1.75c.

STRUCTURAL MATERIAL.—The market is very firm and there s considerable activity. An advance all along the line is likely to be agreed upon within the week, but for the present we still quote: Beams and channels, 3 to 15 inches, 1.50c; 18 to 24 inches, 1.60c; tees, 1.55c; zees, 1.5c; and angles, 1.50c to 1.55c; universal mill plate, 2c.

PLATES.—The plate market is so far unchanged, but the higher price of billets is given as a probable cause of a further advance. There is only a very moderate tonnage being booked. We continue to quote: Tank, 2.10c; shell, 2.20c; flange, 2.30c; fire box, 2¾c to 3¼c.

PIPES AND TUBES.—The mills are well sold up for some months to come and buyers are under the necessity in most cases of postponing their requirements, so that not much tonnage is being booked. The consolidation of the mills is likely to be completed in a short time. We quote the market unchanged as follows: Merchant pipe, base discount, 60 per cent and additional discounts three 10's for less than carloads and four 10's and 5 for carloads, with free delivery on the latter within the prescribed territory; lap weld casing, 50 for screw and socket joint and 45 for inserted joint, with 5 per cent additional on carload orders; boiler tubes, 1¼ to 1½-inch, 45 per cent; 1¾ to 2½ inch, 55 for iron and 60 for steel; 2¾ to 6-inch, 60 for iron and 62½ for steel, all with an extra 5 per cent to dealers.

SHEETS.—Some arrangement seems to have been made whereby mills are a trifle more ready to sell sheets than a week or two ago, but only at prices fully as high as those which have been quoted. A few thousand tons have been sold during the past week for delivery during the second half of the year. The market is very firm, on the basis of 2.85c to 3c for No. 28 common. A number of mills are out of the market altogether, and in any cases it requires a firm offer to do anything at all. Galvanized is decidedly scarce, but there is a limited run of business at 70 and 5 per cent off, with a 15-cent freight allowance, for carload lots.

SPELTER.—The spelter market continues to hold up very well and is to-day a shade higher than a week ago. We quote St Louis 6.70c to 6.75c; Pittsburg, 6.80c to 6.85c, and New York, 6.90c for prime Western grades.

OLD MATERIAL.—This line is unchanged, and we continue to quote: New melting stock, $13.50 to $13.75; old steel rails, long lengths, $12.50 to $13; cut, $13 to $13.50; old iron rails, $17 to $17.50; wrought iron scrap, $14 to $15; cast borings, $8, net, Pittsburg; busheling scrap, $11 to $11.50, net; car wheels (nominal), $14 to $14.50, gross; cast scrap, $12, gross; charcoal scrap, $13, gross; wrought turnings, $8.50 to $9, net, Pittsburg.

COKE.—The coke market is decinedly stronger, and we learn of sales as high as $2.15 for strictly Connellsville furnace coke. We quote the market as follows: Furnace, $2.00; crushed and foundry, $2.15 to dealers and $2.30 to consumers

CHICAGO.

OFFICE OF *The Iron Trade Review and Industrial World*,
1522 MONADNOCK BLOCK, May 17.

General business conditions are much as they were a week ago. The demand for material is still good, and sales are only limited by the fact that mills and furnaces are unable to take much business for nearby delivery. Quotations on pig iron are higher, but with this exception there have been no changes in prices in the week.

PIG IRON.—The local furnaces advanced prices 50 cents a ton early last week, to a basis of $15.50 for No. 2 foundry iron. Following the advance, in spite of it, considerable buying was done, including several quite large lots. Business in Southern irons was not so large, and did not include any very large orders. There are a number of buyers in the market at present, and it is likely that business will result within the next week. Furnaces in this district are all running full or are in preparation to run, and will be started within the next month. The 19 furnaces of the Illinois Steel Co. are all in blast. Iroquois is running full, Minerva is preparing to go in June 1. The South Chicago Furnace Co.'s plant will be in operation about the middle of June. Mayville furnace is running full. The Illinois Steel Co. has plans prepared for two new furnaces at South Works, and is expected to commence work on them immediately. With all this capacity, present and prospective, leading local iron men have figured out that there will still be a large shortage in foundry irons in the next year, and that as a consequence there is every prospect of

prices being higher than they are at present. The demand for foundry irons is increasing all the time. Buyers are using more iron now than ever and their needs are in nearly every case increasing very fast. With the Southern furnaces sold so far ahead as they are at present, and very little hope of any increase in the production of Southern iron, it seems that a shortage is inevitable. The quotations on iron are as follows:

Lake Sup. Charcoal	$17 00@$18 00	Southern Coke No. 3	$15 00@15 50
Local Coke Fdy. No. 1	16 00@16 50	Southern No. 1 Soft	16 00@16 50
Local Coke Fdy. No. 2	15 50@16 00	Southern No. 2 Soft	15 50@16 00
Local Coke Fdy. No. 3	15 00@15 50	Southern Silveries	15 50@16 00
Local Scotch Fdy. No. 1	16 00@16 50	Jackson Co. Silveries	17 00@18 50
Local Scotch Fdy. No. 2	15 50@16 00	Ohio Strong Softeners	15 50@16 00
Local Scotch Fdy. No. 3	15 00@15 50	Alabama Car Wheel	17 50@18 00
Southern Coke No. 1	16 00@16 25	Malleable Bessemer	15 50@16 00
Southern Coke No. 2	15 50@16 00	Coke Bessemer	15 50@16 00

BARS.—The announcement of the formation of the Republic Iron & Steel Co. has been made, and that its headquarters are to be in Chicago, but so far the company has not entered the market as a seller. It is thought the details will be adjusted sufficiently so that sales can be made within a very short time. The demand for bars is good, and sales will be large as soon as the Republic company is prepared to make them. The market has been quiet, and prices are unchanged at 1.60c to 1.70c for common iron, and 1.65c to 1.75c for soft steel, half extras.

STRUCTURAL MATERIAL.—Two or three good contracts were placed in the week, but general business was light, and it is not expected very much business will be done from now on, as the season is so late. The Drainage Canal bridge was let to the Toledo Bridge Co. This takes 1,340 tons, and the successful bid was for $131,200, making a price of 5 cents a pound for the work. This is said to be the highest price paid for such work for a number of years. The new shops of the C. & N. W. Ry, taking 1 000 tons of steel, were let to C. W. Gindele. The Western Electric Co. let a building, taking 520 tons, and 1,000 tons of C. M. & St. P. bridge work went to the Lassig Bridge & Iron Co. Quotations are as follows: Beams, 15 inches and under, 1.65c to 1.70c; 18 inches and over 1.75c to 1.80c; angles under 3 inches and over 6 inches, 1.75 to 1 80; 3 inches to 6 inches, 1.65c to 1.70c. Sheared plates, 2.25c to 2.30c; universal plates, 2.25c to 2.30c; tees, 1.70c to 1.75c; zees, 1.65c to 1.70c. Small lots from stock are quoted at ¼c to ⅓c higher.

BILLETS AND RODS.—No sales of either billets or rods were made by local mills last week. The quotations are only nominal. Prices are about as follows. Bessemer billets, $26 to $27; open-hearth billets, $29 to $30; rods, $34.50 to $36.50.

PLATES.—Sales of plates from store continue large, and would be larger if the local dealers could handle more. Mills are taking very little business. Quotations are unchanged as follows: Tank plates, 2.25c to 2.30c; flange steel, 2.35c to 2.45c; marine steel, 2.45c to 2.55c; fire box steel, 3c and upwards.

SHEETS.—Business has been limited in size because of the inability of the mills to handle any for nearby delivery. Store business has been good both in black and galvanized sheets. Prices are made at 2.85c to 2.90c for No 27 black, and 70 and 10 to 75 per cent off for galvanized.

MERCHANT STEEL.—Conditions have changed very little. The demand is larger than either mills or local stores can handle. Sales last week included several round lots for store shipment. Quotations are as follows: Open-hearth spring, tire and machinery steel, 2.40c to 2.45c; smooth-finished machinery steel, 2.45c to 2.55c; smooth-finished tire steel, 2.25c to 2.35c; tool steel, 6c to 7.50c; special 10c and upwards.

RAILS AND TRACK SUPPLIES.—No sales of either light or standard sections were made last week by the local mills. We quote: Standard section rails, $26 to $27; light rails, $26 and upwards; steel splice bars, 1.40c to 1.50c; track bolts with square nuts, 2.15c to 2.25c; hexagon nuts, 2.25c to 2.30c; spikes, 1.85c to 1.90c.

WIRE AND WIRE NAILS.—Business is about as last reported. The demand is large, and sales in the week were excellent. Quotations are unchanged as follows: Plain wire, $1.95; galvanized No. 14 and heavier, 50c advance; Nos. 15 and 16, 85c advance; Nos. 17 and 18, $1.10 advance; wire nails, $2.10; barb wire, painted $2.20; galvanized, $2.70. All prices are f.o. b., Pittsburg, and on carload shipments all rail freight is added, making a delivered price. Single carload lots are quoted 10c higher.

SCRAP.—Some buying was done last week by a few of the mills connected with the Republic Iron & Steel Co. for their immediate needs. Three orders for 500 tons each of this character were placed, and one larger one. Other business was better, and included two or three quite good sized lots. The demand appears to be growing. Prices are unchanged. Dealers' selling quotations are about as follows:

Old iron rails, gross	$18 50@$19 00	Axles, net	$19 00@$20 00
Old steel rails, long, gr.	13 00@13 50	Cast borings, net	6 00@6 50
Old steel rails, short	11 50@12 00	Wrought turnings, net	8 50@9 00
Old wheels, gross	16 50@17 00	Axle turnings, net	10 00@10 25
Railroad forge, net	16 50@17 00	Mixed steel, gross	8 00@8 50
Dealer's forge, net	12 00@13 00	Overe plates, net	9 00@9 50
No. 1 mill, net	10 50@11 00	Heavy melting steel, gr.	10 50@11 00
Heavy cast, net	13 00@13 25	Old iron splice b., net.	18 50@19 00
Malleable cast, net	8 50@9 50		

CLEVELAND.

OFFICE OF *The Iron Trade Review and Industrial World.*
27 VINCENT ST., May 17.

With May more than half gone the amount of 1899 ore put upon Lake Erie docks is far from indicating that a season of record-breaking production is under way. Vessels that went into the grain trade for their early trips, rather than take ore at the figures offered by ore shippers, have found the experience an unprofitable one in view of the strike of unloaders at Buffalo; and the tie-up there has made tonnage scarce. Later there may be a release all at once of a large amount of tonnage, of which the ore freight market will get its share. At the moment the rates of 70 cents from the head of the lakes and 55 cents from Escanaba represent the market, but very little is doing, and the month of May will end with scarcely a good beginning made in the bringing down of the year's output of ore. There is constant activity in the re-opening of Lake Superior properties, and leading interests are picking up mines that have scarcely been thought of in years. Where the labor is to come from to work additional openings for any calculable tonnage, is still much of a question On the Mesabi the highest wages in the history of that range are being paid for labor at some of the steam shovel properties, and still the supply of men is under the requirements.

PIG IRON.—The $15 price for Bessemer iron was short-lived, though several lots were disposed of at that figure, and iron from furnaces outside of the valleys to the amount of 40,000 tons is reported sold at figures in the neighborhood of $15 at furnace. At a meeting on Saturday, the valley producers advanced the price to $16 at furnace, and 10,000 tons are reported sold at that figure with further inquiries pending. It is evident that a large amount of Bessemer iron will yet be needed by steel works in Ohio and in the Pittsburg district above the purchases made for delivery in the second half of the year. It is quite as evident that these needs will be beyond the ability of the Bessemer furnace capacity to supply, in view of their present engagements for the third and fourth quarters. A further advance is predicted and for second quarter delivery quotations above $16 have been made by a Pittsburg selling interest. The foundry furnaces have made advances of from 50 cents to $1 a ton in the past week. Not a few sales have been made at $15.50 valley furnace for No. 2, and $16 is now asked in some cases, with small sales made at that figure. Foundrymen are showing more concern about making sure of a supply of their accustomed irons in the quantity their greatly increased consumption will require, than about the possibility of higher prices, though this is now generally conceded. Furnaces are coming to be so well sold up to the end of the year that they are paring down orders that call for third and fourth quarter delivery, so as to be in position to do the best possible for the largest number of regular customers. With some of them it is simply a question of the amount of 1899 business that will be declined in the end. Some help is to come from furnaces not yet started, but it will be neither immediate nor great. Southern gray forge has sold in the valleys at $10.75, Birmingham, or $14.45 delivered, one lot of 2,000 tons being reported; but the price is now $11 at Alabama furnace. We quote valley furnace forge at $14.50 to $14.75 at furnace. Struthers furnace has gone in this week after a speedy relining. The product is basic iron. It is reported that the Cherry Valley furnaces were not transferred to the Republic Iron & Steel Co., but only the rolling mill of the Cherry Valley Iron Works. We quote the market:

Bessemer	$16 65	Valley Scotch No. 1	$16 65@17 15
No. 1 Strong Foundry	16 65@17 15	Valley Scotch No. 2	16 15@16 65
No. 2 Strong Foundry	16 15@16 65	Gray Forge, valley	14 50@14 75
No. 3 Foundry	15 65@16 15	Lake Superior Charcoal	17 00

FINISHED MATERIAL.—The largest transaction of the week waes 3,000 tons of material for bridge work. While beams and channels which mills can promise in from one to two months on some sizes, are kept at 1.50c, Pittsburg, angles are much more difficult to get and as high as 1.75c, Pittsburg, has been paid for angles smaller than 3-inch. On plates no quotation is made by some mil's; but sales are reported at 2.25c for tank steel and 2.50c for flange. Bar iron has sold at 1.50c, valley mill, in large lots, and 1.60c, Cleveland, while 1.75c, Cleveland, has been paid for bar iron out of stock. Steel bars are quoted 1.75c, Pittsburg, for delivery in the last quarter of the year; on some early delivery business 2c, Pittsburg, has been paid. The sheet mills are selling very little and jobbers' stocks are being picked up, the mill quotation being 2.75c for No. 27, which out of stock are quoted 3c, Cleveland. There has been a good mail business the past week and the consideration is not so much the price, but getting the material promptly. The Hull & Dutton building is being figured on, but otherwise architectural work is not large.

OLD MATERIAL.—The buying method of the Rep blic Iron & Steel Co. has not developed, but it is expected the new company will soon be in the market. There has been little doing of late in mill scrap, but the foundries are steady buyers. We quote machinery cast scrap at $12 to $12.50; cast borings, $7.50 to $8; grate bars, $8; stove plate, $8.50; old car wheels, $16. No. 1 railroad wrought scrap is quoted $16 in the valley; old iron rails, $19; old steel rails, $13.50 to $14.

CINCINNATI.

April 25

Matthew, Addy & Co. say in their current review: "A very fair business has been done during the past week. There has been nothing big in the way of foundry orders, but the scattering tonnage has been in the aggregate considerable and the prices are high. There have been further sales of gray forge in the Pittsburg district at about $1,075, Birmingham, and there have been some very satisfactory sales of chilled metal for use in the basic open-hearth furnaces. The demand seems to be getting more lively and there is not anything in the situation that does not promise well." The views of Rogers, Brown & Co. are expressed as follows: "Notwithstanding production increased during April some 17,000 tons, stocks at the furnaces and warrant yards were reduced during the month some 54,000 tons. These facts must impress observers and those interested with the seriousness of the situationt in that the extremely low stocks are being rapidly impaired. Customers are being greatly inconvenienced by the insufficiency of foundry irons and must exercise great patience for the time being, as there can be no appreciable increase in production for some 60 days. The demand keeps up remarkably. The business of the week has been of good full volume. The market is very firm, with every indication of an advance in prices. We quote for cash f. o. b., Cincinnati: Southern coke, No. 1 foundry, $15.25; No. 2, $14.50 to $14.75; No. 3, $13.75 to $14.25; No. 4 and gray forge, $13 to $13.50; mottled, $13.25 to $13.50; No. 1 soft, $15 25; No. 2 soft, $14 50 to $14.75; Lake Superior coke, No. 1, $16.25 to $16.50; No. 2, $15.75 to $16; Hanging Rock charcoal No. 1, $20 to $21; Jackson Co. silvery No. 1, $17.50 to $18; Standard Georgia car wheel, $15.75 to $16.50; Lake Superior charcoal, $18.75 to $19.25.

MINERVA Furnace, at Milwaukee, Wis., will be started up about June 1 on standard grades of foundry iron, from Lake Superior ores, by the Minerva Pig Iron Co., composed of S. Frank Eagle and W. Aubrey Thomas. The selling agency of the furnace, which has an annual capacity of about 40,000 tons, is at 720 The Rookery, Chicago.

WORK will begin in the coming summer on three new furnaces for the Cambria Steel Co., two of these to have a capacity of 500 tons a day. It was the intention originally to take these furnaces to the shore of Lake Erie, but it is stated that concessions in freights were obtained from the Pennsylvania Railroad which puts the steel company on a basis to compete with Pittsburg.

THE latest acquisition of coke lands at Uniontown, Pa., by the National Steel Co., consists of 717 acres. With it 50 acres of surface land was sold near the extension of the southwest branch of the Pennsylvania Railroad. Contracts will be let immediately for the sinking of two shafts 280 feet deep and for the erection of 600 beehive coke ovens.

American Foundrymen's Association at Pittsburg.

The third annual convention of the American Foundrymen's Association was called to order at 10:15, Tuesday morning, by Wm. Yagle, president of the Pittsburg Foundrymen's Association, in the hall of the Monongahela House, Pittsburg. The visiting foundrymen were first welcomed by W J. Diehl, mayor of Pittsburg. In the course of his remarks he said that the foundrymen could not have come to a better place, as Pittsburg was a leading foundry center. The first foundry was established in 1802 in Pittsburg, and the first stove foundry in 1830. He referred to the various interesting industrial establishments to be visited, the parks, boulevards, etc. On behalf of the city he presented the key.

After an introduction by the chair, Clarence Burleigh, city attorney, made an interesting address, in which he referred to the fact that he was once a pattern maker, and thus closely associated with the foundry trade. He reviewed the industries of the Pittsburg district at some length, and made the statement, which might not be credited at first off-hand, that the tonnage of the rivers passing Pittsburg is greater than that of New York harbor.

John Bindley, president of the Pittsburg Chamber of Commerce, was the next speaker, and in a carefully prepared speech showed the magnitude of Pittsburg's industries. He said the association represented an industry employing 70,000 men, and using material which cost $100,000,000 annually. He referred regretfully to the sentiment which had so far prevented the union of the communities in the region into one city, and that in consequence the census of 1900 would show Pittsburg as the thirteenth city in the country in point of population, instead of the fourth, as would be the case if the whole district were brought under one municipal control. He stated that there were really five cities in the county, and that within a radius of 60 miles there was a greater population than in any similar territory west of the Allegheny mountains. In 1890 this territory had 100,000 more population than Chicago, 500,000 more than Cincinnati, and 700,000 more than St. Louis. Pittsburg has miles and miles of harbor and river frontage, and in a short time there will be a boating stage at all times of the year from the headwaters of the Monongahela to Mississippi river points, to New Orleans and to the ocean. The Pittsburg clearing house for some time has been fifth in the list in the United States. He reviewed at length the position of the Pittsburg district in the manufacturing lines of iron, steel, glass, etc., in which she is pre-eminent, and also minor lines, such as locomotives, lamp chimneys, aluminum, etc. In 1898, the tonnage was 50,000,000 tons, and this year is likely to reach 60,000,000. The railroad freight movement amounts to 2,000,000 cars of 20 tons, while to this should be added the river tonnage. He stated that one concern causes more freight than is hauled over the Grand Trunk Railway of Canada, or than the whole cotton crop of the South amounts to.

Chairman Yagle followed in an address of welcome, and expressed the thanks of the Pittsburg Foundrymen's Association for the honor shown by the visiting foundrymen, and introduced Mr. C. S. Bell, president of the American Foundrymen's Association, who assumed the chair. In his opening remarks, Mr. Bell referred to the fact that the founders had not partaken of the general prosperity to the extent they merited, on account of having to fill orders taken below the basis which would be established by the range of prices on raw materials now ruling. He said that in some cases foundrymen are now filling contracts at a loss, due to this condition.

Greeting from German Foundrymen.

Dr. R. G. G. Moldenke rose to present a communication he had received from the German foundrymen, which he had translated as follows: "The foundrymen of Germany send hearty greetings to their American brethren now in convention at Pittsburg. They admire the energetic and effective manner in which science and practice have been made to go hand in hand in the development of the industry, and consequently expect to hear of still further achievements coming from the free exchange of thought on foundry methods and results at these useful gatherings." The communication was signed "Henning, Captain German Imperial Guard."

On motion, Dr. Moldenke was appointed to make a suitable reply.

Under reports of committees, Secretary John A. Penton reported on the condition of the association, referring to the value of one branch of the association's work, which would be shown in the report of the standardizing of the testing of cast iron. He stated that new members admitted had kept the membership above 300, although there had been no active campaign to increase the membership. He referred also to the valuable work which had been accomplished by the National Foundrymen's Association formed recently through this association. In the absence of Treasurer Evans, on account of ill health, which was much regretted, Mr. Penton made a verbal report, which showed the finances to be in good condition.

Dr. R. G. G. Moldenke, chairman of the committee on standardizing the testing of cast iron, read a report of the work so far accomplished. [It is printed elsewhere in this issue.] The committee was continued until the work is completed. The immense amount of work to be done in this connection was touched upon, and it was pointed out that the committee's work would be better appreciated when all the returns were in and formulated.

A communication was next read from the Union Trust Co., of Pittsburg, inviting the foundrymen to inspect its new banking house, including the safe deposit vaults, and the new armor plate vault, which is fitted up with the most complete burglar-proof system in the world. There are 185 tons of armor plate in the vault.

The chair then referred to the nomination of officers for next year, and called upon each of the four local associations to select one member, while he would select a fifth to complete the nominating committee.

Tuesday afternoon was spent in an enjoyable trolley ride, special cars being provided for the visitors. The cars proceeded to Schenley Park, where an hour's stop permitted the inspection of the Carnegie library and museum, the latter containing a very fine collection of works of art and zoological and botanical exhibits. After a ride through the East End residence district the cars were run to Highland Park, where lunch was served and a visit paid to the recently established zoeological gardens, which were an object of considerable interest.

Some Interesting Exhibits.

The exhibits prepared for the convention, which were displayed at the Monongahela House, have attracted a great deal of attention. There were some very fine specimens of German and Russian foundry work, secured by Secretary Penton, which were greatly admired. Besides the trade exhibits, which included some fine specimens of coke from the H. C. Frick Coke Co., the "coreine," introduced within the past two months by the J. D. Smith Foundry Supply Co., which requires no rosin, flour, oil, molasses, or anything else with which to dampen core sand; and specimens of ground gravel, and lump fluor spar by the General Chemical Co., etc., there was a wide range of exhibits which were all subjects of interest.

An ancient Japanese bell was loaned by H. K. Porter. It was about two feet high, and cast of bronze. Its outside was ornamented with a number of figures, and was covered with knobs, the molding for which must have been very difficult. In the upper portion the shell was only an eighth of an inch thick. The casting was made of bronze.

Samuel P. Haller loaned a stove cast at Antietam in 1779, which makes it 120 years old. It was of the old wood burning type, and was really simply a cast iron box made of plates, cast in open sand, and bolted together. There was exhibited with it the side of such a stove, which had been cast at the same place in 1772

The exhibit prepared by Dr. Moldenke to illustrate the work of the committee on testing, consisted of three sets: Set A cast of ingot mold iron by Thos. D West; Set B, cast of dynamo frame iron by J. S. McDonald, of the Westinghouse Electric & Mfg. Co., and Set C, cast of light machinery iron, also by Mr. McDonald. These sets were donated to the association by the respective manufacturers. The specimens consisted of pieces showing the fractures of the different test bars, from ½-inch to 4 inches square and round, of equivalent sectional areas, in both green sand and dry sand. The most noticeable feature in these specimens was the change from the close grain of the small specimens to the open grain in the large ones, although all the specimens in each set were cast at the same time. In Set A was shown a very full shrinkage due to the open grain. Set B showed uniformly good specimens while in Set C the holes in the center indicated piping.

One of the exhibits which attracted the greatest attention was a set of cast iron plates which had been punched with a rapid punch by A. Speer & Sons, the plow manufacturers of Pittsburg. The plates ranged in thickness from ⅛-inch up to ½-inch in thickness, the holes being from ⅛ to 13 16-inch in diameter. All the holes were perfectly smooth, including the 13-16-inch hole in the ½-inch plate. The smaller plates had each a number of holes punched in them, and there was a plate 5-16-inch thick which had a number of ½-inch holes, two of which had less than 1-16 inch between them, and yet the metal was perfect at all points. The pieces punched out showed a peculiar appearance, different from that of steel, which always comes in one solid piece. There seemed to have been a compression which partially divided the iron in the piece, the appearance being that of a conical shaped piece projecting up into the remainder of the portion, but there was not a complete separation between them. The iron used in these castings was Clinton foundry iron, mixed with a small percentage of scrap.

There were five interesting framed photographs showing the Uehling method of casting and conveying metals, and as a counterpart to this were exhibits by the Keystone Bridge Works of name plates, and by the Westingouse Electric & Mfg. Co., of name plates and watt-meter boxes, with lettering on the outside, all cast from sandless pig iron, showing what good work is being done with this iron. There were also exhibited some fine heads of cameo cast of this metal.

The exhibit of the Pennsylvania Car Wheel Co included a number of interesting specimens, showing the iron used in this class of work, together with portions of complete wheels. Mattew Addy & Co., had some fine specimens of their various irons, all cast in molds at the furnace. The exhibit of Chas. Herman & Sons, of ores of silver, lead, iron, aluminum, tc., attracted a great deal of attention.

Tuesday Evening.

The Tuesday evening session was an interesting one. A. W. Walker, of the Walker-Pratt Mfg. Co., Boston read a paper on "A New England Foundry," and W. J. Keep, a paper on "Original Methods of Handling Materials at the Works of the Michigan Stove Co., Detroit, Mich." Both were illustrated with especially prepared stereopticon views, and in connection with these, questions were asked and answered.

Those in Attendance.

Up to Tuesday evening the following members and visitors had registered: C. S. Bell, C. S. Bell & Co., Hillsboro, O.; Howard Evans, J. W. Paxson, & Co., Philadelphia; John A. Penton, *The Foundry*, Detroit; Wm. Yagle, Wm. Yagle & Co., Pittsburg; J. S. Seaman, Seaman-Sleeth Co., Pittsburg; P. H. Zimmers, Union Foundry & Machine Co., Pittsburg, S. S.; I. W. Frank, Frank-Kneeland Machine Co., Pittsburg; Philips Mathes, Brittan & Mathes Co., Carnegie, Pa; Dr. R. G. Moldenke, McConway & Torley Co., Pittsburg; S. D. Sleeth, Westinghouse Air Brake Co., Wilmerding; Robert Taylor, Taylor, Wilson & Co., Ltd., Allegheny; Dr. W. B. Phillips, *American Manufacturer*, Pittsburg; T. A. Malone, J. S. McCormick & Co., Pittsburg; F.N. Hoffstot, Clinton Iron & Steel Co., Pittsburg; Samuel W. Hay, Whiting Foundry & Equipment Co., Pittsburg; Howard M Hooker, Rogers, Brown & Warner, Pittsburg; E. P. Botsford, Pittsburg Malleable Iron Co., Pittsburg; George Rollings, Pittsburg Malleable Iron Co., Pittsburg; R. Wise, Keystone Coal & Coke Co., Pittsburg; James Kelly, A. H. Childs & Co., Pittsburg; E. A. Kebler, Matthew Addy & Co., Pittsburg; J. S. McCormick, J. S. McCormick & Co., Pittsburg; W. T. Mobberley, Taylor, Wilson & Co., Allegheny; Robert A. Walker, *Iron Age*, Pittsburg; S. H. Stupakoff, Union Switch & Signal Co., Sissvale; S. T. Johnson, the S. Obermayer Co., Chicago; C. L. Doyle, H. C. Frick Coke Co., Pittsburg; B. E. V. Luty, *The Iron Trade Review*, Pittsburg; Dr. K. F. Stahl, General Chemical Co., Pittsburg; N. P. Hyndman, Washington Coal

& Coke Co., Pittsburg; Victor Bentner, Julian Kennedy, Pittsburg; Edward Maher, Maher & Flockhart, Newark, N. J; H. S. Vrooman, Chicago; R. C. Barr, Cleveland & Barr, Chicago; John W. Burr, Burr & Houston Co., Brooklyn, N. Y.; Robert Blythe, Walker & Pratt Mfg. Co., Watertown, Mass.; Chas. B. Seaman, Seaman-Sleeth Co., Pittsburg; Jos. S. Seaman, Jr., Seaman-Sleeth Co., Pittsburg; C. W. Friend, Clinton Iron & Steel Co., Pittsburg; Edw. B Rose, Damascus Bronze Co., Pittsburg; Oliver Wylie, Wm. Yagle & Co., Pittsburg; Wm. Altsman, Jas. Collord & Co., Pittsburg; E. W. Antony, Smith, Antony & Co, Boston, Mass.; Jos. S. McDonald, Westinghouse Electric & Mfg Co., Pittsburg; Benj D. Fuller, Westinghouse Electric & Mfg. Co, Pittsburg; J. H. Johnston, Taylor, Wilson & Co, Pittsburg; W J. Keep, Michigan Stove Co., Detroit; George H. Lincoln. George H. Lincoln & Co., Boston; John Magee, Magee Furnace Co. Boston; I. W. Winchester. Magee Furnace Co., Boston; J. C. Slocum, P. H. & F. M. Roots, Connersville, Ind.; W. Fitzpatrick, S. Obermayer Co. Cincinnati; Alex. Taylor, Westinghouse Electric & Mfg Co. Pittsburg; J. J. Burgen. Land Mfg. Co., Montpelier, Vt.; L. S. Brown, Springfield Facing Co., Springfield, Mass.; Alva Carpenter, A. Carpenter & Sons Foundry Co, Providence, R I; F. B. Farnsworth, McLagon Foundry Co., New Haven, Conn.; Victor Swenson. Condor Foundry Co, Boston; C. W. Friend, Clinton Iron & Steel Co., Pittsburg; Eli Millett, Millett Core Oven Co., Springfield, Mass.; T. W. Friend, Clinton Iron & Steel Co., Pittsburg; E. B. Pierce, Wheeler Foundry Co., Worcester, Mass.; C. J. Langdon, Fulton Foundry Co., Cleveland, O.; John F. Mills, Abendroth Bros, Port Chester, N. Y.; Willis Brown, Walker Foundry Co., Erie, Pa.; J. D. Smith, J. D. Smith Foundry Supply Co, Cincinnati; J. G. Sadlier, Springfield Foundry Co., Springfield, O.; W. A. Jones, W. A. Jones Foundry & Machine Co., Chicago; F. S Cadwell, Hill & Griffith, Cincinnati; H M. Irwin Elliot Car Co., Gadsden Ala.; John Hill, Hill & Griffith, Cincinnati; J. P. Gardner, *American Manufacturer*, Cincinnati; J. R. Homer, J. R. Homer Foundry Co., Galion, O.; M. F. Richardson, Ohio Cultivator Co., Bellevue, O.; E. M. Drummond, Drummond Mfg. Co., Louisville, Ky.; F. F. Sheriffs, Sheriffs Mfg. Co., Milwaukee, Wis.; D. B. Hyde, Safety Emery Wheel Co., Springfield, O.; R. J. Scott, Struthers, Wells & Co., Warren, Pa.; F. C Mosedale, M. A. Hanna & Co., Buffalo, N. Y.; H. M. Wilson, Taylor, Wilson & Co., Allegheny; J. H. B. Bryan, Snow Steam Pump Co, Buffalo, N. Y.; C. L. Wolff, L. Wolff Mfg. Co., Chicago; J. R. Russel, Russel Wheel & Foundry Co., Detroit, Mich.; C. W. Russel, Russel Wheel & Foundry Co., Detroit, Mich.; J. C Ford, Spring Lake Iron Co., Freeport, Mich.; E. S. Reid, Whiting Foundry & Equipment Co., Chicago; E. S. Walker, J. I. Case Threshing Machine Co, Racine, Wis.; W. W. Cheney, S Cheney & Sons, Manlius, N. Y.; John A Meighen, Dawson Bros. & Meighen, Pittsburg; R. M. Dyer, Aermotor Co, Chicago; O. T. Stantial, Illinois Malleable Iron Co., Chicago; J. R. Steneck, Illinois Malleable Iron Co., Chicago; John W. Diven, Diven Bros. & Co., Baltimore, Md; Andrew McDuff and Henry Miller, Stilwell-Bierce & Smith-Vaile Co., Dayton, O. Victor E Knecht. Phoenix Iron Co, Cincinnati, O.; R. S. Buch, A. Buch & Sons, Elizabethtown, Pa; J. H. Hillman, J. H. Hillman Co., Pittsburg; J. H. Hillman, Jr., J. H. Hillman Co., Pittsburg; B F. Eagan, H. E. Pridmore, Boston, Mass.; Jas. S. Stirling, Harlan & Hollingsworth Co., Wilmington, Del.; Millard F. Carr, J. W. Paxson & Co., Philadelphia; W. J. Early, W. A. Early, Jas. S Early, John N. Early, W. J. Early & Sons Pittsburg; B. P. Bacon, Pickands, Brown & Co., Chicago; W. F. Prince, Henry R. Worthington, Elizabethport, N. J.; John H. Morcum, Col. Iron Works, Denver Col.; J. Cordingly, Queen City Foundry Co., Denver, Col.; A. G. Sotherland, Kansas City Wire & Iron Co., Kansas City, Mo.; E. Kneeland, Frank Kneeland Machine Co, Pittsburg; W. W. Sly, W. W. Sly Patent Cinder Mills, Cleveland; W. P. Warren, Jr., Fuller & Warren Co., Troy, N. Y., Francis Cavanaugh, Roberts, Winter & Co., Quakertown, Pa.; Seward Babbitt Port Royal Coal & Coke Co., Pittsburg; W. M. McMillan, Damascus Bronze Co., Pittsburg; W. B. Sterritt, Sterritt & Thomas, Pittsburg; G. F. Eldridge, C. R. Baird & Co., Philadelphia; J.W. Friend, Clinton Iron & Steel Co., Pittsburg; Chas. W. Hass, Stillwell. Bierce & Smith-Vaile Co., Dayton, O.; J. R. Cullingworth, Robert Wetherill & Co., Chester, Pa.; J. M. Stoever, Robert Wetherill Co., Chester, Pa.; J. E. Lyon, Brown & Sharpe Mfg. Co., Providence, R. I.; Geo. H. Anderson, Secretary Chamber of Commerce of Pittsburg, Pittsburg; Bartlett M. Shaw, Walker & Pratt Mfg. Co., Watertown, Mass.; Wm. H. Switzer, Superior Foundry Co., Little Falls, N. C.; M. A. Moran, Carnegie Steel Co., Pittsburg; John McClaran, Phillips & McClaran, Pittsburg; Geo. Mesta Mesta Machine Co, Pittsburg; G. A. Sharp W L. Sharp & Son, Steubenville, O.; W. H. Rea Mesta Machine Co, Pittsburg; J. H. Becker, Clinton Iron & Steel Co., Pittsburg; S. B. Robinson, Robinson Machine Co., Monon City; Jesse Cornelius, Hecla Iron Works, Brooklyn, N. Y.; Robert B. Lean Crescent Foundry & Construction Co., Allegheny; J. P. Golden, Golden Foundry & Machine Co., Columbus, Ga.; A. W. Walker, Walker & Pratt Mfg. Co, Boston, Mass.; D J Thomas, Sterritt & Thomas, Pittsburg; F. A Goodrich F. A Goodrich & Co., Detroit, Mich.; F. W Frazier, Keystone Coal & Coke Co., Pittsburg; F. H. Watt Watt Mining Car Wheel Co., Barnesville, Ind.; Alex. Jarecki, Jarecki Mfg. Co., Erie Pa.; H. S. Bell, Dodge Mfg. Co., Mishawauka, Ind.; C. M. Collins, Dodge Mfg. Co., Mishawauka Ind.; W. C. Swift, Pridmore Molding Machine Co., Chicago, Ill.; Alexander W. Slocum, Chas. V. Slocum, Pennsylvania Car Wheel Co., Pittsburg; W. H. Coffin, T. P. Kelly, New York Foundry Supply Co., New York; Jos. A. Kelly, Chas. Bailey, Reliance Steel Casting Co., Pittsburg; Samuel Wickes, Lorain Steel Co, Lorain, O.; F. E. Mesta, C. J. Mesta, Mesta Machine Co., Pittsburg; Edwin H. Oswuld, Benedict & Burnham Mfg. Co., Waterbury, Conn.; W. T. McCutcheon, Safety Emery Wheel Co., Springfield, O.; John J. Torley, John H. Noble, Kinzer & Jones Mfg. Co., Pittsburg; A. H. Childs, A. H. Childs & Co., Pittsburg; V. M. Delamater, Superior Iron Co., Snarpsburg, Pa.; E. M. Gross, Keystone Coal & Coke Co., Pittsburg; E. A. Uehling and G. H. Ginther, Uehling method of casting and conveying metals, Pittsburg; Edward Thomas, James E. Thomas Co., Newark, O.; Harry S. Hill, Taylor, Wilson & Co., Ltd., Allegheny; F. W. Bauer, Warder, Bushnell & Glessner Co., Springfield, O.; W. A. Noble and James Hayes, Aultman, Miller & Co., Akron, O.; L. F. Gray, Miller, Wagoner, Fieser & Co, Columbus, O.; C. Birmingham, Pittsburg Lamp & Brass Co., Pittsburg; James J. Keley and Nicholas Keley, M. Keley & Sons, Pittsburg, S. S.; S. Groves, Westinghouse Machine Co., E. Pittsburg; Paul Kreutzpointner, Pennsylvania Railroad Testing Department Pittsburg; J. M. Ryan, D. J. Cullinan, John Pfeil, McConway & Torley Co., Pittsburg; S. M. Rodgers, American Steel & Wire Co., Pittsburg; F. E. Gordon, Ohio Sand Co., Conneaut, O.; Wm. T. Bradberry, Anshutz-Bradberry Co., Allegheny; H. T. Irwin, Rosedale Foundry Co, Pittsburg; James Boyce, Kinzer & Jones Mfg. Co. Pittsburg; R. F. Parker, Pittsburg; Thos. D. West, Thos. D. West Foundry Co., Sharpsville Pa.; C. W. Jones, Rosedale Foundry Co., Allegheny; Frank Anshutz, Anshutz Bradberry Co. Allegheny; J. C. Reed, Standard Mfg Co, Pittsburg; W. E. Magraw, *The Iron Trade Review*, Chicago; G. H. Gardner, *The Iron Trade Review*, Cleveland; A. J. Miller, Jr., Whitehead Co, New York; D. L. Evans, Rosedale Foundry, Pittsburg; W. D. McKeefrey, McKeefrey & Co, Leetonia O.; C. W. McCleery, McCleery & Co., Leetonia, O.; N. P. Hyndman, Washington Coal & Coke Co., Pittsburg.

REPRESENTATIVES of the manufacturers and workmen held the customary bi-monthly conference last week in Pittsburg, regarding the selling prices of the sheets made during the previous two months, and it was found that the preponderance of operations on old time contracts was such that no advance above the base rate was called for the sheet scale.

THE regular monthly meeting of the Engineer's Society of Western Pennsylvania was held last Tuesday evening. The paper of the evening was entitled "Pittsburg, with Its Black Diamonds," by A. P. Kirtland, secretary of the Marble Hill Quarry Co. The meeting of the Chemical Section will be held Thursday evening, the paper being "Suggested Improvements in the Manufacture of Wrought Iron," by Samuel Peters, of the Pittsburg Reduction Co.

REPUBLIC IRON & STEEL CO.

The organization of the Republic Iron & Steel Co was perfected at New York on Thursday, May 11. The board of directors is composed of August Belmont, August Belmont & Co.; Myron C. Wick, formerly president of the Union Iron & Steel Co., of Youngstown, O.; Grant B. Schley, of the banking firm of Moore & Schley, of New York City; Randolph S. Warner, formerly of the King, Gilbert & Warner Co., of Columbus, O.; George E. Sheldon, a banker of New York; J. G. Caldwell, of the Birmingham Rolling Mill Co., Birmingham, Ala.; G. Watson French, of the Sylvan Steel Co., Moline, Ill., Alexis W. Thompson, of the Atlantic Iron & Steel Co., New Castle, Pa.; George D. Wick, president of the Mahoning Valley Iron Co., Youngstown, O.; John F. Taylor, of the Brown-Bonnell Co., Youngstown, O.; T A. Meysenburg, of the Tudor Iron Works, St. Louis; L. E. Cochran, of the Andrews Bros.' Co., Youngstown, O.; James C. Corns, of the Corns Iron & Steel Co., Massillon, O.; H. W. Hassinger, of the Alabama Rolling Mill Co., Birmingham, Ala.; P. L. Kimberly, of New Castle, Pa.; George M. Bard, of the Indiana Iron Co., Muncie, Ind.; George M. Clark, of the Mitchell-Trantor Co., Cincinnati, O.; Samuel Thomas, of the Pioneer Mining & Mfg. Co., Birmingham, Ala.; S. J. Llewellyn, of the Inland Iron & Forge Co., Chicago, and Harry Rubens, of the law firm of Rubens, Dupuy & Fischer, of Chicago. The directors elected the following officers:

President, Randolph S. Warner.
First vice-president, George D. Wick.
Second vice-president, Samuel Thomas.
Third vice-president, James C. Corns.
Fourth vice-president, George M. Bard.
Secretary, Silas J. Llewellyn.
Treasurer, John F. Taylor.
General counsel, Harry Rubens.

Executive committee—Myron C. Wick, Alexis W. Thompson, John F. Taylor, T. A. Meysenburg, G. Watson French, George D. Wick, Harry Rubens, S. J. Llewellyn and Randolph S. Warner.

The offices of the company have been established at Chicago.

Wages in Rolling Mills and Tin Plate Works.

The annual wage convention of the Amalgamated Association of Iron and Steel Workers began its sessions at Detroit on Tuesday, May 16, with the largest attendance of delegates in many years. In the past year the organization has made great gains in membership with the help of prosperity in the iron trade, and full employment for all rolling mill and steel works employes. The wage committees met in Pittsburg Thursday of last week to get the scales in shape. The greatest secrecy is always maintained as to what demands will be made in the way of wages, and little can be learned as to the character of the scales which are likely to be formulated for submission to the manufacturers in the various lines. It is certain that an advance will be asked in puddling, of at least 50 cents a ton. In the tin plate scale, another effort will no doubt be made to draw up a form of sliding scale which can be understood and which will make the wages actually vary with varying market conditions. The paragraphs adopted in the last few years have not embraced these two features.

It has been decided by the Tin Plate Workers' International Protective Association, which recently held its first annual convention in Columbus, to hold the next convention in Pittsburg, the first week in next May. The permanent headquarters will be in Ellwood, Ind. A scale was adopted for wages in the tin houses, but the terms are kept secret. It will be presented for a conference to the representatives of the American Tin Plate Co., the company having some time ago signified its willingness to treat officially with the organization on the matter of wages. At present the wages in the different plants are not the same and if the representatives can come to terms the result will be uniform wages in all the tin houses, just as the wages of the tonnage men in the tin mills are uniform. Hugh J. Scanlan, vice-president of the association, was selected as a delegate to the convention of the American Federation of Labor, to be held in Detroit next December.

CONDITION OF BLAST FURNACES OF U. S.*

May 1, 1899.

Location of Furnaces.	Coke and Anthracite. Total No. of Stacks.	In Blast. Number.	In Blast. Weekly capacity.	Out of Blast. Number.	Out of Blast. Weekly capacity.	Charcoal. Total No. of Stacks.	In Blast. Number.	In Blast. Weekly capacity.	Out of Blast. Number.	Out of Blast. Weekly capacity.
New York	11	3	4205	8	6164	2	2	214	0	0
New Jersey	2	2	1764	0	0					
Spiegel	3	1	502	0	0					
Pennsylvania:						13	2	110	11	550
Lehigh Valley	26	16	8695	10	4775					
Spiegel	1	0	0	1	90					
Schuylkill Valley	12	7	5468	5	3093					
Upper Susqu. Val.	4	3	3061	1	600					
Lower Susqu. Val.	10	5	5162	5	1820					
Lebanon Valley	12	11	8075	1	534					
Spiegel										
Pittsburgh	28	27	60736	1	2045					
Spiegel	2	2	1890	0	0					
Shenango Valley	15	11	17663	4	4439					
Western Pennsylvania	20	8	10115	12	6040					
Spiegel	1	0	0	1	850					
Maryland	5	3	5314	2	1950	4	0	0	4	569
Wheeling District	9	8	11363	1	1080					
Ohio:						7	2	140	5	300
Mahoning Valley	13	10	17174	3	3255					
Central & Northern	9	9	13045	0	0					
Hocking Valley	2	1	992	1	550					
Hanging Rock	12	7	3041	5	1147					
Illinois	16	14	26178	2	1750					
Spiegel	1	1	934	0	0					
Minnesota	1	0	0	1	629					
Wisconsin	4	3	3081	1	700					
Missouri	2	1	930	1	600					
Colorado	3	2	2386	1	700					
Virginia	22	9	6305	13	7720	4	0	0	4	437
Kentucky	5	5	3370	0	0	3	0	0	3	200
Alabama	30	9	19559	11	8750	12	2	691	10	2250
Mich., Mo. and Wis.						18	7	3023	11	4190
Tennessee	13	6	4471	7	3890	9	1	275	8	2240
Georgia	2	0	0	2	960	3	0	0	3	670
North Carolina	2	1	650	1	400					
New England						11	3	240	8	710
Texas						4	1	163	3	710
Utah						1	0	0	1	175
Oregon						1	0	0	1	275
Totals	298	197	245249	101	64809	92	20	4846	72	12976

SUMMARY.

Fuel.	In Blast. Number.	Month Previous.	Year Previous.	In Blast. Weekly Capacity.	Month Previous.	Year Previous.	Out of Blast. Number.	Month Previous.	Out of Blast. Weekly Capacity.	Month Previous.
Charcoal	20	17	18	4,846	4,777	6,571	72	75	12,976	13,641
Coke and Anthracite	197	188	176	245,249	240,969	237,592	101	111	64,809	67,406
Total	217	205	194	250,095	245,746	234,163	173	186	77,785	81,047

*Condensed from the *Iron Age*.

The New Carnegie Steel Co. Stock.

Subscriptions were opened in Chicago this week by Moore Brothers to the underwriting of the new Carnegie Steel Co. stock. It is reported that subscription rights have been sold at 106. The total capitalization is $625,000,000 of which $100,000,000 is in 5 per cent bonds, $250,000,000 in 6 per cent non-cumulative preferred stock, and $275,000,000 in common stock. The subscribers for 100 shares of preferred stock will pay into the company $10,000 and receive in return 100 shares each of preferred and common stock. Subscription books have been opened simultaneously in Chicago, New York, Philadelphia and Pittsburg. Under the terms of the subscriptions the money is payable when a call is made at the First National Bank in New York, the Union Trust Co. in Pittsburg, the Illinois Trust & Savings Bank in Chicago, the First National Bank in Philadelphia, and the Old Colony Trust Co. in Boston.

The company secures $15,000,000 in cash as working capital, and all the assets, including stock on hand and collectable accounts of all the companies included in the consolidation. Three separate examinations have been made by different committees of experts, who have gone carefully into the production of ore, pig iron and finished steel. The reports show that on present prices for iron and steel, the company would earn between $40,000,000 and $45,000,000 a year. The interest requirements on the bond issue of $100,000,000 is $5,000,000, and the 6 per cent dividend on $250,000,000 of preferred stock, will require annually $15,000,000 or a total charge of $20,000,000 ahead of the issue of common stock.

THE IRON TRADE REVIEW
AND
INDUSTRIAL WORLD.

DEVOTED TO MACHINERY, METAL-WORKING AND FOUNDRY TRADES AND IRON AND STEEL MANUFACTURE.

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G. H GARDNER, President. A. I. FINDLEY, Editor.

CHICAGO:
1522 MONADNOCK BLOCK.
B. M. GARDNER, Associate Editor and Western Manager.

PITTSBURG:
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MAY 18, 1899.

THE BETTER DAY OF THE FOUNDRY.

The convention of the American Foundrymen's Association in Pittsburg this week meets under very different circumstances from those attending the first national gathering at Philadelphia three years ago. For the first time in many years, there is a rising market for the products of the foundry. There have been spurts in the iron trade in comparatively recent years, conspicuously that of 1895, but they have only doubled the hardship of the founder, who until last year had a steadily falling market for castings. And as a rule foundry buyers of pig iron have found in the last 10 years that the last deliveries on a given pig iron contract were coincident with a market price lower than that at which they bought. But those of them who were foresighted enough last year to make contracts reaching as far ahead as the furnacs would sell are congratulating themselves to-day. On the other hand, as President Bell noted in his opening address at Pittsburg, there are some who are paying top prices for iron to finish out contracts for castings taken on the low basis of last year.

A noteworthy fact about the foundry situation to-day is that labor questions have been disposed of with less friction than in any year since the foundry association movement started. The reasons for this have been commented upon already in these columns; but it is sufficient to say now that organization among foundrymen, while it did not specifically aim at the settlement of labor problems—and doubtless it would have failed signally, had it made that attempt in the beginning—has achieved in this direction what deserves to rank alongside the advances it has made in practice and in more thorough acquaintance with the materials with which the foundryman works. At the Detroit convention two years ago, the keynote of addresses by President Schumann, of the association, and of President Martin Fox, of the Iron Molders' Union, was that mutual hardships and losses would bring molders and proprietors closer together, and replace division and strife by conciliation and harmony. The wonderful changes that have come over industry in the interval have resulted in mutuality in prosperity rather than in distress; and foundry employers and employes, as the result of wise use of the forces of organization on both sides, have agreed as to the distribution of the fruits of better times. In the East, some stubborn contests are on; but for the most part wage agreements have been reached by conference. And not only this, but arrangements have been made by which in the future, antagonisms will be less and less, and conciliation and agreement more and more the rule.

Then the members of the American Foundrymen's Association are to be congratulated upon the advance made in their art through the educational work of the association. Foundry operations are on a far different basis from that of six years ago when the association movement was only getting fairly under way. The work of a few men, who saw that scientific methods properly applied had large possibilities of improvement for the foundry, has been full of results, in the face of faint praise and even depreciation. The two movements set on foot at Cincinnati last year—and both started in the Pittsburg Foundrymen's Association, by the way—have done more than any action taken before, to give the foundry industry a standing among men who know the value of science as applied to the operation of works. In establishing a central agency for chemically standardized drillings of iron, and in undertaking through a committee the stupendous task of experimenting for the purpose of establishing standards for foundry test bars, the association has initiated work whose outcome is of international importance

It is true, as Mr. Edgar S. Cook said in his paper before the Philadelphia Foundrymen's Association two weeks ago, that if a choice must be made between a man thoroughly acquainted with foundry work, and of good judgment, but having no chemical knowledge, and a theorist, well equipped so far as school equipment goes, yet with little or no acquaintance with foundry conditions, the practical man would be preferred in every instance. But the day is rapidly coming when, so far as important foundries are concerned, the choice need not be made. The best practical man will be the one who applies to his work methods calculated to give the maximum of certainty and the minimum of loss. And the co-operation of the pig iron manufacturer and the intelligent use of the test bar in the foundry will make it possible for even the smaller foundries, that have been treated as entirely beyond the pale of applied metallurgical science, to make advances now regarded as unattainable. The day of the union of the scientific and the practical in foundry work is at hand, and the American Foundrymen's Association and the local organizations that have made that association possible, are to be congratulated on their splendid work to this end.

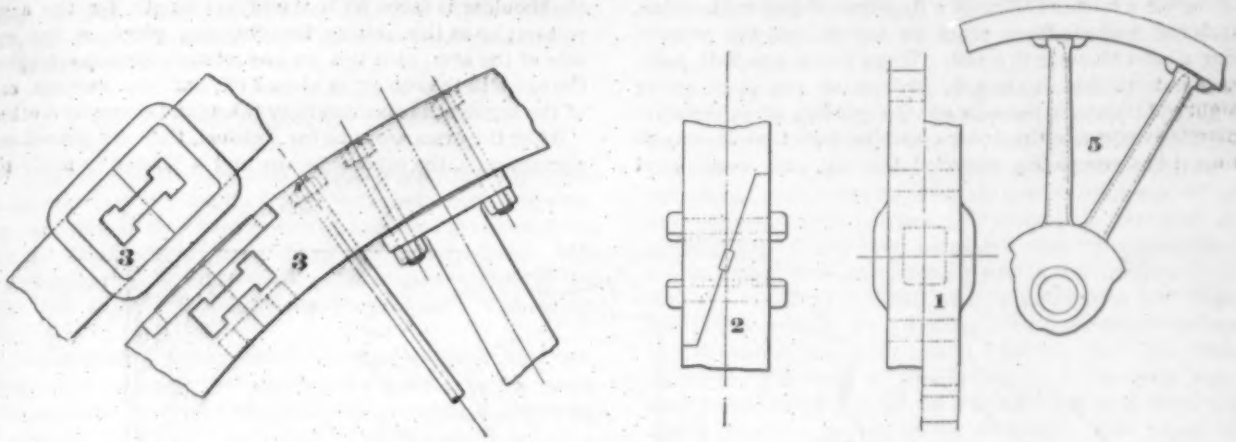
It is reported that F. H. Buhl, of Sharon, Pa., is negotiating with the James Wood estate for the Wheatland rolling mill at Wheatland, Mercer Co., Pa.

ROLLING MILL FLY-WHEELS.*

BY JOHN FRITZ, BETHLEHEM, PA.

In the early days of rolling mills, the machinery was of the crudest character. The men who built and looked after it were called millwrights, or forge carpenters; consequently, wood was used in its construction to as great an extent as possible. All of the earlier fly-wheels, as you will see by the cuts, had wooden arms; at least so far as I know, and Fig. 4 shows the general way of fitting them in. They were made of hard wood, locust or white oak preferred, and about six to eight inches in thickness, width as per tracing. Figs. 1, 2 and 4, give the plan of securing the rims of the wheels together. The segments are in halves, and secured together with gibs and keys, same as shown in Figs 4, 4, iron, as shown in Fig. 3. The center, arms, and segments were cast separately, and had the ends of the segments been well fitted together, the wheel would have given no trouble. The slots of the tees were, unfortunately, too close to the end of the segment; the result was that they pulled the end of the casting off, and we had to chip grooves across the face of the wheel, and put heavy links around them, as shown on tracing Fig. 2, which made a good wheel out of it. This was done in 1854, and I think the wheel is yet in use, but never ran at high speed.

Not considering these wheels safe, I was in constant fear of their going to pieces, which is generally attended with the most disastrous results. I abandoned entirely the old mode of making wheels, and adopted plan No. 5—casting the center and arms together, and the rim in one piece, with lugs on the inside of the rim, as shown on tracing Fig. 5. On the ends of the arms were pads to correspond with the lugs on the rim.



FIGS. 1, 2, 3 AND 5—ROLLING MILL FLY WHEELS.

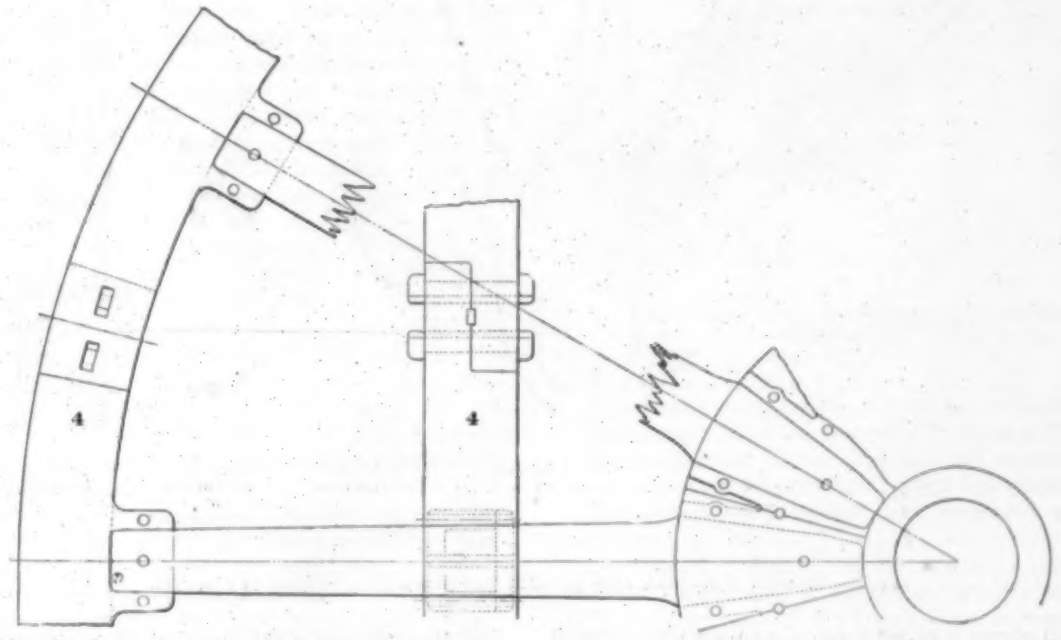


FIG. 4—METHOD OF SECURING SEGMENTS.

Having no machine tools when these wheels were built, they were put together practically as the castings came from the foundry, with the lumps and swells chipped off with a two-handed chisel and sledge, which naturally caused a weak wheel. They were made of cold-blast charcoal iron, which was greatly in their favor, and no doubt this fact prevented many accidents.

In the course of time the millwright and carpenter were displaced by the machinist, and with the introduction of machine tools, especially the planer, the wheels were better fitted up, but not much safer, in consequence of the use of the iron, made from mineral coal, in place of charcoal.

The machinist now became the mechanical engineer, and wood not being his forte, he made the fly-wheel all of cast

When the arms were put in the rim, there was a space of about one-quarter of an inch, in which oakum was driven tightly, which kept the arms in place. This made an excellent wheel, and in some cases wood was used to fill the space in which thin steel keys were driven. There are several of these wheels that have been in use for 35 years, and, so far as I know, never have given any trouble. The wheels were 20 feet in diameter, with rims about 12 inches square.

With the introduction of steel for rails and structural material, it became necessary to increase the diameter of rolls. This change necessitated heavier wheels, and larger in diameter, which made it impracticable to use the solid rimmed wheels; consequently, some plan that was portable had to be adopted. After much thought the plan represented by Fig. 6 was concluded the best and safest, and there are now a number of wheels of this type in use, varying in diameter

* Read at the Washington meeting (May, 1899) of the American Society of Mechanical Engineers.

from 20 to 30 feet. I do not know that any of them ever has given a particle of trouble in any way, and there are a number of wheels, as per Fig. 6, that have been in use for 25 years, some which have, and are daily liable to encounter the most severe strains that it is possible for a fly-wheel to be subjected to, and are to-day apparently as safe as the day they were started.

It has been said that fly-wheels go to pieces in consequence of the irregular work, and engines driving dynamos for power purposes have been included in this class; but the strain on a fly wheel driving a dynamo cannot be compared with that of a rolling mill. In the former the work occasionally varies from nil to full power, while that of an engine driving a rail mill changes from nil to practically full power while rolling a single rail twelve times, which requires about one minute.

Let us for a moment think of a fly-wheel 26 feet in diameter, 16-inch rim, making from 70 to 80 revolutions per minute, rolling a steel bloom into a rail. When about one-half done, say, about 16 feet in length, instead of the piece going straight out, through the rolls on the guides, as intended, it sometimes wedges in the groove, and in less than a second of time it has completely encircled the roll, and forms what in rolling-mill phrase is called a collar, and continues to wind around the roll until something must happen, either the breaking of a roll, a spindle, or coupling, or the engine must be brought to a standstill in an almost incredibly short space of time. The tortion on the spindles and couplings is so great that it causes the wheel to rebound. To calculate the strain the wheel is subjected to under these conditions will require some one better posted in mathematics than I am.

I have alluded to the fact that the introduction of steel in various forms required larger rolls, heavier wheels, and larger in diameter, which made it impracticable to use a solid rimmed wheel. Then came the adoption of plan of wheel, Fig. 6; the tracing makes it so plain that it wants but little explanation. The segment is cast hollow, and also the arms, which are made at the ends to compare in thickness to the segment, so as to relieve them of strains which might occur if the segments were cast solid. The holes in the segment are small at the ends, so as to make up for the metal taken out for the tees. The links, or tees, are different lengths, so that the strain on the segments will not come all at one place, and by using oil-tempered steel in the links, or double tees, the rim will be practically as strong at the joints as it is elsewhere.

In fitting up the wheel, the center is bored out, and the ends of the hub faced off. It then is taken to the planer, and a center-guide plate for the hub is made, and bolted to the planer table. Then a boring bar is arranged to bore out the hole, and face it off to a given distance from the center for the shoulder of the arm to rest on. There are small chipping pieces on both inner sides of the receptacle for the arm. They are planed off at the same setting, to the proper and uniform width, and true to the center. This finishes the center.

Next the arm goes on the planer and is set to the true average center, and with a socket on the end of the boring bar with inside cutters the end of the arm is turned off, and the shoulder is faced off to the proper length for the arm to rest on; so at this setting the chipping piece on the upper side of the arm, as it lies on the planer, corresponding with the same in the center, is planed off, and the average center of the segment is also carefully taken and correctly worked.

After the arms are thus far finished, they are placed on the planer again, the other side up, and a socket is made to fi

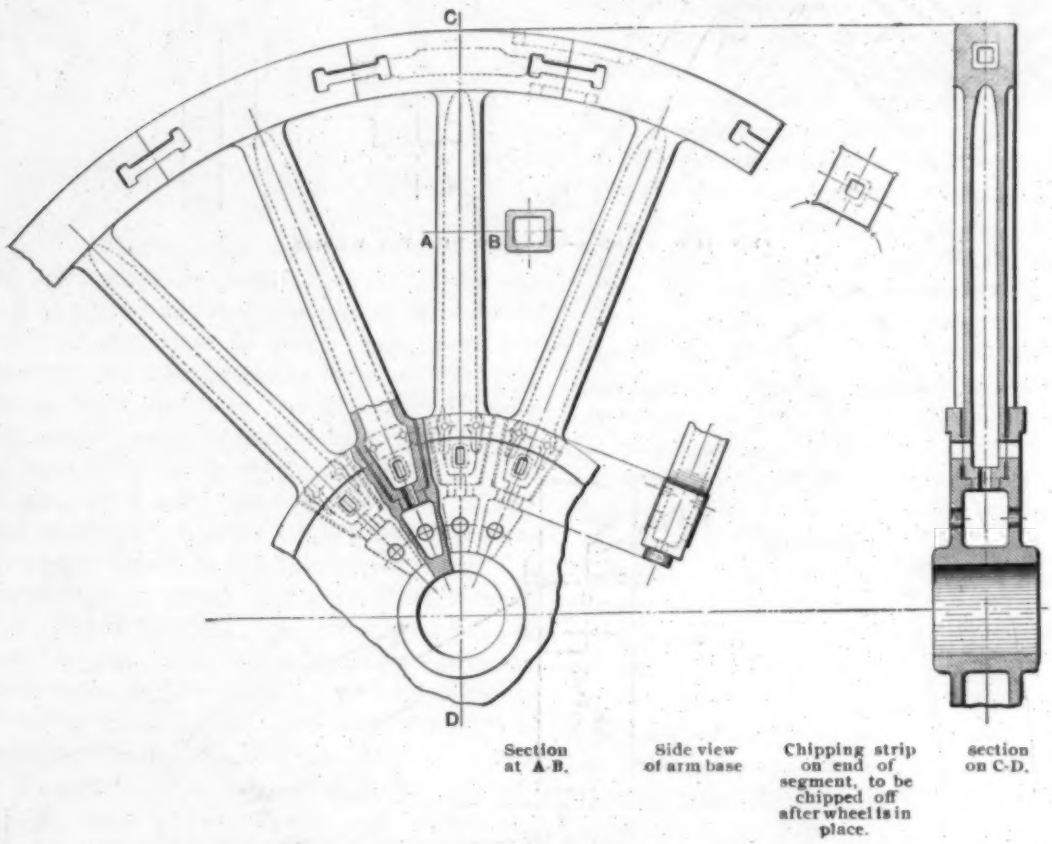


FIG. 6.—28-INCH RAIL MILL AND 33-INCH BLOOMING MILL ENGINE FLY WHEEL.

over the end of the arm which goes into the socket and against the shoulder. On the opposite end of the socket is a hole bored, say 1½ inches or 2 inches in diameter. The length of arm must be, from the center of the hole to the bottom of socket which arm rests on, the same as the distance from the face upon which the arm rests in the center of the hole in shaft. Next secure a pin on the planer bed to correspond in size with the hole in the end of the socket piece. Then put the socket on the end of the arm and on the pin; then bolt the arm down true on the side that is planed, and finish to the proper size. When this is done, find the exact size of the segment and set in line with the center, and you have the exact angle; and when all is done correctly the wheel will fit together without a chisel or a file being used on it, and will run true, without turning, minus the irregularities in the castings.

There are no abrupt changes in the thickness of the castings, thus avoiding as much as possible the liability of the strains. The joints in the segments are generally the weak part of the wheel. In this respect a wheel made from this

drawing will be stronger than the original, as the tees in the segments in the wheel now in use were made of wrought iron, and will probably not stand over 50,000 pounds tensile per square inch, while in this wheel, if I was to build another, I would use steel that would stand at least 85,000 po nds tensile. This would make the joints practically as strong as the segments.

It will be noticed on tracing there is a space in the center of about ¼ inch in front and rearside of each arm. This is filled with oakum and driven hard, after the wheel is finished and in place, to keep the arm from yielding in the direction of the strain, and at the same time greatly lessens the work of fitting up the wheel. The 1¼-inch round holes shown on tracing, through the center and arm, are reamed out, and steel pins made and turned so that they will drive in snugly. The bolt shown in segment in Fig. 3 does not belong to this wheel, but was simply put in there to show the plan that, in many cases, was adopted to make the wheels more secure, and is used to some extent at this time.

EFFECTIVE FIRING OF BOILERS.

A question that touches the cost sheet, in that it involves not only the fuel bill, but the life of the steam plant, and combustion with a minimum of smoke, is discussed in the machine shop and foundry columns of *Dixie* by Frank Lederle. The suggestions are valuable not only to the man in front of the boiler, but to superintendents and proprietors. The writer says:

"One system of firing, which has been much commended, and which is known as the 'one-shovel system' in some parts of the country, derives its name from the practice of charging but a small quantity of coal upon a thin fire at a time but at frequent intervals. The effect is that a large volume of air comes in contact with the fresh fuel, and a combustion takes place which is practically smokeless. Other engineers, however, contend that better results, both as to economy and smokelessness, may be obtained by working fires on the thick system of firing, using heavy charges and regulating the air admission by dampers. This can, of course, only be attempted where there is ample boiler capacity and where the load is not a fluctuating one. One English writer claims that he has seen a battery of boilers, Lancashire type, the furnaces of which were charged a few times a day only, the fires being carried within a few inches of the furnace crowns. The draft in this case was good and the dampers partially closed. A slight raising of the dampers was sufficient to send the steam pressure up when it fell; the grate bars being kept well covered In another instance reports of tests on thick and thin fires showed that where thin fires had been used on a long grate, the shortening of the grates and thickening of the fires showed a great gain in economy. The excess of air per pound of fuel was greatly reduced, the total air consumption amounting to only 14 pounds per pound of fuel.

"It does not follow, however, that the use of such thick fires demands a reduced rate of combustion per square foot. When the thickness of a fire is increased it would appear to be the proper course to increase, as well, the draft so as to deliver to the bed of fuel the proper amount of air necessary for combustion, and this can only be done successfully where there is either a very powerful chimney draft or some mechanical device for increasing this draft at will. In the locomotive, we have an example of the latter kind, where the rate of combustion per square foot of grate runs as high as 60 to 100 pounds of coal per hour, the air being pulled through the thick firing bed by means of the draft created by the exhaust in the stack. And with a properly arranged furnace to burn the gases driven off, the locomotive will show enconomical results and smokeless combustion, equal to that of the ordinary stationary boiler. The possibilities of using thick fires and powerful draft in any boiler do not, however, do away with the necessity of providing in each case for a proper setting so that the air and gases may complete their combustion."

Brunk & Heyer, located for the past eight years at Lorain, O., operate a machine shop and forge. They do general marine and city jobbing work, which has been extensive of ate, in view of the rapid increase in the business of Lorain, both as a manufacturing center and as a lake port.

WESTERN FOUNDRYMEN'S ASSOCIATION.

The annual meeting of the Western Foundrymen's Association was held at the Great Northern Hotel, Chicago, May 10th, at 7:30 p. m., Vice-president A. M. Thompson in the chair. Those present were the following: Robert Barr, Cleveland & Barr; H. S Vrooman; B R. Marchand, Illinois Steel Co ; J. H. Dalton, Walburn Swenson Co.; E. E. Hanna, Gates Iron Works; W. A. Jones, W. A. Jones Foundry & Machine Co.; A. M. Dyer, Aermotor Co.; C. H. Hopke, Western Foundry Co.; M. Salomon, Chicago Architectural Iron Co.; A. M. Thompson, Link-Belt Machinery Co ; B. M. Gardner, *The Iron Trade Review*; L. B. Melville, *Railway Review*, Theodore Kauffman, S. Obermayer Co.; J. L. Hecht, McCormick Harvesting Machine Co.; H. L. Hotchkiss, Deering Harvester Co., all of Chicago; John A. Penton, *The Foundry*, Detroit, Mich.

The minutes of the previous meeting were ordered approved as published.

The secretary presented a verbal annual report, calling attention to the fact that the association has not been as prosperous as could be wished in the past year, and stating that the membership has fallen off to a considerable extent. The secretary urged every member to use his influence to secure new members and to arouse new interest in the work of the association. It had been suggested that the association take up the question of sustaining prices in the territory it covers, and the secretary reported that a committee had been appointed to canvass this question, with instructions to make a report embodying some plan whereby the idea could be adopted. The work of the association in the past year has not covered much ground, as it has been almost impossible to secure papers to be read at the meetings. The report of the secretary was received and filed.

The treasurer reported as follows:

TREASURER'S REPORT MAY 15, 1899.

Balance on hand May 15, 1898	$213.47
Indebtedness, May 15, 1898	Nil
Total receipts, May 15, 1898, to May 15, 1899	383.58
Expenditures, May 15, 1898, to May 15, 1899	588.85
Balance on hand, May 15, 1899	8.20
Indebtedness, May 15, 1899	Nil

Details of Expenditures.

Previous secretary's expense	$ 7.00
Printing and stationery	114.25
Postage	75.10
Stenographer	356.00
Exchange	.45
Banquets, entertainments, etc	30.00
Misc. Expenses, telegrams, express, etc	6.05
Total	$588.85

Comparison of Years Ending May 15, '98, and May 15, '99.

	May 15, 1899.	May 15, 1898.	Decrease.
Total Receipts	$383 58	$ 944.17	$560.59
Total Expenditures	588.85	1199 38	610.53
Balance on hand	8.20	213.47	205.27

The treasurer's report was received and ordered placed on file

The committee on the Control of Prices and Uniform Credit System, appointed at the last meeting, reported little progress, and asked for more time, which was granted.

The election of officers was then proceeded with, resulting as follows:

President, C. J. Wolff, L. M Wolff Mfg. Co.; Vice-president, William Ferguson, Wm. Ferguson Foundry Co.; secretary, B. M. Gardner, *The Iron Trade Review*; treasurer, R. J. Cleveland, Cleveland & Barr. Directors.—James Frake; A. M. Thompson, Link Belt Machinery Co.; C. H. Hopke, Western Foundry Co.; M. Salomon, Chicago Architectural Iron Co.; F. G. Coffeen, Deering Harvester Co. Editing committee.—B. M. Gardner, J. E. Evans, of S. Obermayer Co., and W. A. Jones.

The chair was authorized to appoint a committee of three to secure the next convention of the American Foundrymen's Association for Chicago, and the committee was instructed to use its best efforts to this end. C. J. Wolff, S. T. Johnston and W. A. Jones were appointed as such committee

A general discussion of the benefits to be derived from membership in foundrymen's associations followed. The meeting was addressed by Secretary John A. Penton, of the American Foundrymen's Association. Mr. Penton gave some reasons why the various foundrymen's associations have not been as successful as usual in the past year, and expressed the hope that with the better business the foundrymen of the country are now getting the membership and attendance at meetings of all the associations will be largely increased. Mr. Penton extended a very cordial invitation to Western foundrymen to attend the Pittsburg convention of the American Association.

THE HEYL & PATTERSON PIG IRON CASTING PLANT.

The fact was noted in these columns a few weeks ago that a pig iron casting and conveying apparatus, manufactured by Heyl & Patterson, of Pittsburg, Pa., under their patents, had been installed at the Cambria Steel Co.'s blast furnace plant, Johnstown, Pa., and was doing good work. Some views of the Johnstown plant are reproduced herewith, together with a drawing showing the general plan and construction of the apparatus. The Heyl & Patterson machine consists of a steel frame combining a water tank and upper and lower parallel tracks, a pair of chains carrying pressed steel molds or pans, into which the liquid metal is poured from the ladle through intervening runners, so arranged that the stream to two or more lines can be equalized. The method consists of the pouring of the metal into the molds while they are traveling at such a level as to be partly immersed in water, in which condition they continue to travel for a sufficient length of time to allow the material to become fixed, when they are submerged. In this condition they travel through the balance of the length of water tank, and by the time they emerge the pigs are sufficiently cold to allow of their being loaded on wooden cars.

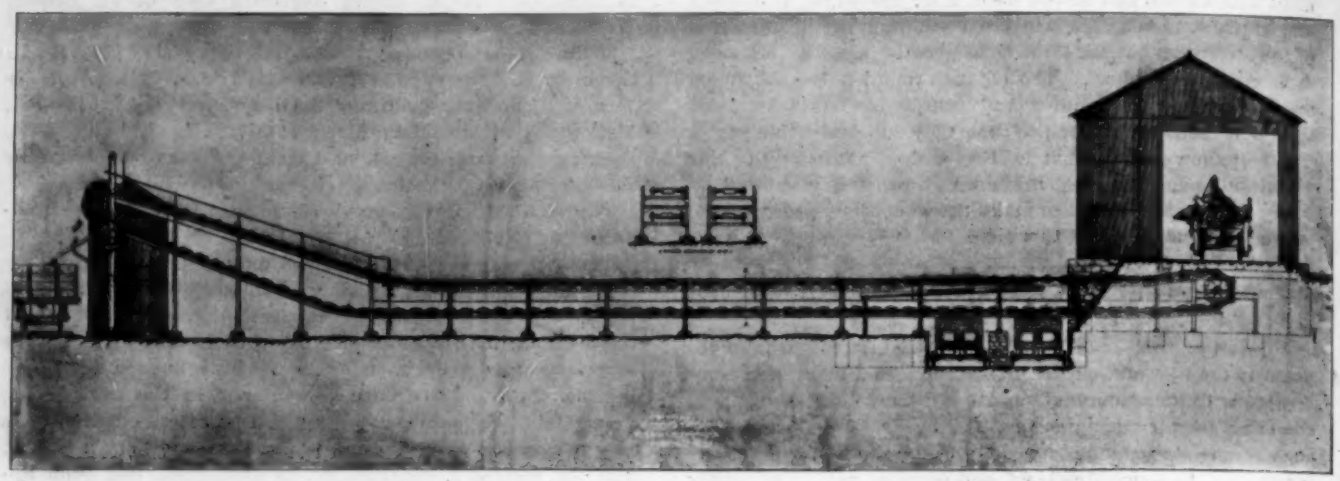


FIG. 1.—HEYL & PATTERSON PIG IRON CASTING AND CONVEYING APPARATUS.

The molds as they return are inverted, and pass over furnaces, in which is burned gas coal, or preferably natural gas or crude oil. Being still damp when they reach the furnace a heavy deposit of soot or carbon adheres to the interior and the lips of the molds. The heat also dissipates any remaining moisture. Owing to the deposit of carbon, it is possible to use molds with large overlapping lips. As the deposit of carbon prevents the iron, which falls on the lip as it passes through the stream, from adhering to or coming to rest and chilling on the lips, the pigs all discharge freely at the head end.

Fig. 1 is reproduced from an outline drawing, and shows a complete elevation of the machine with ladle in position when pouring. Fig. 2 is a general view of the plant looking toward the head end, and showing the water tanks filled. Fig. 3 is a view taken at the head, or discharge end. The building to the left is the engine house. The two strings of molds are driven from the one pinion shaft, each pinion being equipped with friction clutch, and one or both conveyors can be operated at pleasure.

Fig. 4 shows the furnaces, over which the molds pass to be dried and coated. These furnaces are mounted on wheels, so that they may be withdrawn when it is desired to stop the machinery for short periods of time.

The molds, when they leave the water tanks, travel up a considerable incline. This is done in order to discharge the pigs at a sufficient height to load in railroad cars. It is entirely practical to make the grade steeper and attain a much greater height if desired. The plant illustrated is a double one. Each conveyor or machine is, however, entirely complete in itself. In designing this machine, special attention was given to the securing of large wearing surfaces, maximum strength for each pound of material in motion, and the accessibility of every part. The patent was granted May 25, 1897. Other patents are pending in the United States and in foreign countries.

The plant at Johnstown was put in operation in the early part of February and has been entirely successful. Heyl & Patterson have under contract plants for the Palmer Ship Building & Iron Co., Jarrow-on-Tyne, Eng., and for the National Steel Co., at its new Youngstown furnaces, formerly the Ohio Steel Co.'s plant. The capacity of the Johnstown plant is 1,500 tons in 24 hours. It requires only 14 h. p. when running at full capacity. The chain links are 24-inch pitch, with 2-inch diameter through the axles, which form the pins of the chain and 8-inch diameter chilled traction wheels on the ends of the axles. The molds having long over-lapping lips, are of such design that they allow for a very considerable wear at each joint in the chain before it will be necessary to replace the links.

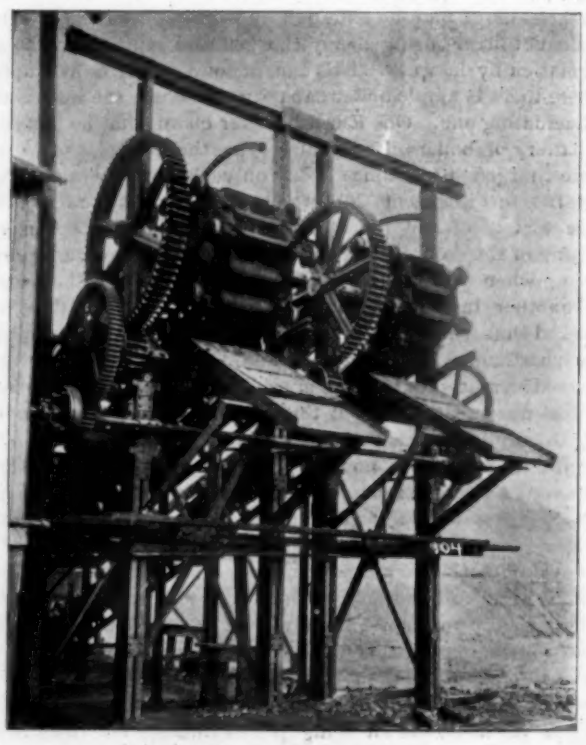


FIG. 3.—VIEW OF CASTING MACHINE AT DISCHARGE END.

M. A. HANNA & Co., Cleveland, whose well known furnaces are the Buffalo, at Buffalo, and Mabel and Claire, in the Shenango valley, are selling also the product of the Union Furnace, which is soon to be started up at Buffalo, making foundry iron. This firm has also taken the Franklin Furnace at Franklin Iron Works P. O., N. Y., and will put it in blast. The stack is 70x15, built in 1871 and remodeled in 1883.

QUICK REVOLUTION STEAM ENGINES.—II.*

BY ARTHUR HERSCHMANN.

Grid valves, favored in this country, are practically unknown on the other side, where piston valves are most generally used. Their use involves the equipment of the cylinder with spring relief valves. The piston valve gives a port opening all around the circumference and therefore large. Many engineers would not have a piston valve without a bushing or liner

FIG. 2.—GENERAL VIEW OF CAMBRIA STEEL CO. CASTING PLANT.

and there is also a difference of opinion whether these valves should be packed or plain. My experience is that most attention should be paid to the manner in which the piston valve is being driven, the valve spindle should be as light as possible and the stuffing box, through which it passes, should be of a high class. Under such circumstances there should be no necessity for a packing of the valve and a few narrow grooves turned on its outside will make it sufficiently steam tight. My opinion is also that a separate liner is not required if the valve is light, properly finished and its seat in the cylinder casting well lapped.

A case came within my observation, where complaint was made that the valve had badly scored its seat and that this would not have occurred had a special liner been provided for its seat. The fact of the matter was that the valve seat had been finished by means of emery powder which was not carefully removed before setting up the engine. This, by the way, can be avoided in having the finished cylinder casting blown and cleaned with compressed air, a process superior to the application of steam for this purpose.

The greatest amount of attention has to be paid to proper design of moving parts, pins, slippers, bearings and eccentrics. These have now not only to be sufficiently strong, but also large enough to prevent heating, and to avoid that the oil is squeezed out from them, due to great specific pressure. The inside of cylinders is generally polished to minimize surface and therefore reduce condensation, the joints of engines of a high class are scraped and oil is only used for making the joint. The next best practice would be to use thin wire gauze and red lead. In any case it is important that all the joints are so arranged that it is not necessary to disturb them to effect minor repairs on the engine. The pistons of upward from say 14-inch should be light and solid, with broad faces and

FIG. 4.—FURNACES OVER WHICH MOLDS PASS TO BE DRIED AND COATED.

narrow, well fitted (Ramsbottom) rings, usually three in number. (Fig. 9). Pistons with junk rings or those having screws for adjustment should be avoided wherever possible in quick revolving engines.

The piston rod is, with the best types of such engines, forged in one with the crosshead block and the latter is fitted with registers to dispense with heavy clamping bolts to take shearing strain. (Fig. 10). The tendency is to design the

* Read at the meeting of the Engineers' Society of Western Pennsylvania, Tuesday evening, April 18, 1899.

parts so that the attendant of an engine should not have much chance to apply his own judgment in the matter of adjustments. Every high class engine is equipped with spring relief valves, which, on the vertical engine, can be to advantage combined with the drain and indicator cocks in one casting or fitting and coupled together and driven from below with one lever equipped with an indicator segment to show the working position of the fittings. Opinions differ as regards the va ue of double nuts to prevent the jarring loose of the bolts. I should only use double nuts on crankshaft pedestals and otherwise supplant them with high single nuts, fine thread and split pins. Spring washers will be found to give good results.

Too much attention cannot be paid to the matter of balancing. It is a good notion to balance large vertical piston valves by enlarging their upper steam-exposed ring surface so that the steam will counteract their weight (Fig. 11). To balance the moving parts, it is customary to either enlarge the crank diametrically opposite the crank pin or else to clip a separate balancing casting around the webs. (Figs. 12 and 13).

An amount of compression should be provided for, so, that at dead centers, it will be equal to the end pressure of the steam on the piston, plus the inertia of the moving parts of the engine, otherwise a knock will occur. (Fig. 14). Some builders of quick-running engines prefer to let the thrust change its direction before dead centers; but of course it is irrelevant where this reversal takes place as long as it takes place quietly. It can be noticed in some vertical engines that the shaft does not fall in the same vertical plane as the axis of the cylinder.

The arranging of two cranks, side by side, with centers opposite, as in Fig. 15, is an efficient means of balancing the vertically moving parts of an engine; it also facilitates lubrication by relieving the main bearing periodically, but this is

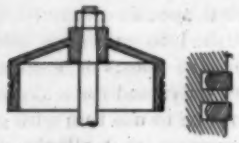


Fig. 9

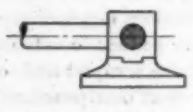


Fig. 10

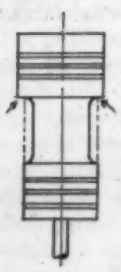


Fig. 11

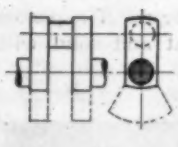


Fig. 12

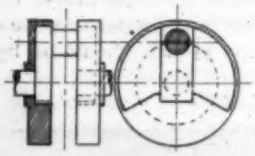


Fig. 13.

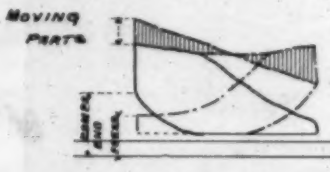


Fig. 14.

not considered best practice, since, for high speeds, it will still be necessary to balance each cylinder by itself and the couple set up axially in the engine, as it were, tends to twist its frame.

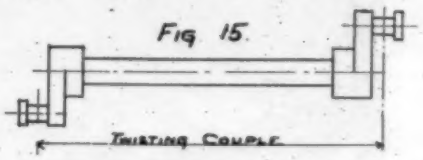
In my opinion great credit is due the firm of Messrs. Belliss, Ltd., of Birmingham, Eng., who many years ago advocated a three-crank engine in which the middle cylinder balances the two end cylinders; the latter being both alike, as in Fig. 16.

Messrs. Belliss, being largely engaged on admiralty work, may also be considered pioneers in the application of forced lubrication to high speed engines. There are a few explanatory diagrams on the table for which I am indebted to Messrs. Belliss & Co. Single acting engines like the Westinghouse or the Willans engine, rely on splash lubrication, the crank churning up a lubricating bath and throwing the oil all over the parts within the engnie frame. The lubrication of most high speed engines of the open type is effected by means of a central oil reservoir in front of the engine, with as many little pipes, taps and unions as there are points to be reached and to be supplied with oil. Such an arrangement requires constant attention and a tight cap may prevent the lubricant thus fed from reaching the parts that would just require most oil. To effect this lubrication automatically, in the "enclosed" type of high speed engine, a pump is arranged within the frame, sufficiently large to flood all the moving parts and surfaces to which it connects by means of suitable links. (Fig. 17 shows the usual style of pump for this purpose).

The pressure carried is usually from 15 to 25 lbs. Sometimes, the pump forces into one of the bearings first, the oil rises from there through a hole in the crank pin and shaft up along the connecting rod and to the guides and slippers. (See Fig. 18). In another instance (Björnstad's engine), a large distributing pipe is arranged parallel to the shaft, from which distributing pipe little copper pipes branch off and lead to swiveling levers, which latter are hollow, to convey the oil to the crosshead and down the connecting rod, whilst separate pipes go to the bearings. (See Fig. 19).

To insure an even flow of oil this engine is also equipped with a little weighted accumulator, blowing off, should the pressure rise unduly. In all these self-lubricating engines the oil goes through a strainer first into a receptacle from which the pump draws. With forced lubrication there is actually always a film of oil between the shaft and the bearing, so that wear is almost imperceptible and such double acting engines, requiring but little attention, may be run much quicker than those relying on gravity lubrication.

Some people, it appears, contend that lubrication of the steam cylinders is not necessary, but the majority is still in



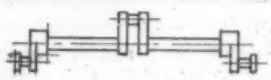


Fig. 16

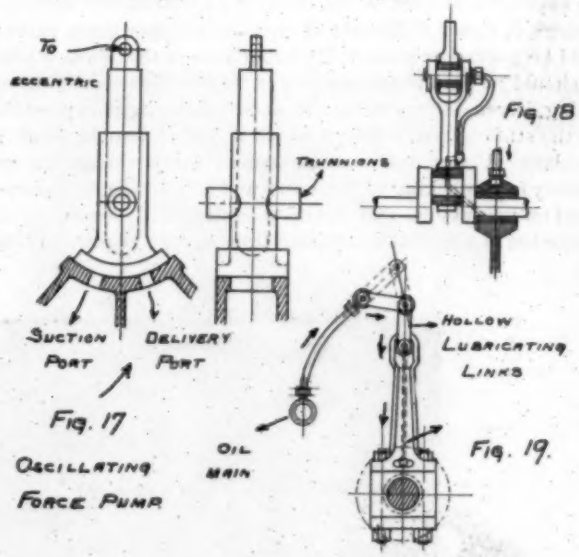


Fig. 18

Fig. 17

Fig. 19.

favor of a copious lubrication of all the wearing parts of an engine and to effect same with the best of mineral oil, which will not carbonize or leave a deposit on the lubricated parts. The mechanical efficiency of engines fitted with automatic pressure lubrication is in spite of the high rotational speeds, very great, reaching the figure of 96 per cent, whilst 92 per cent efficiency is commonly attained.

(Concluded.)

Advance in Puddling and Bar Mill Wages.

The conference at Pittsburg last week between James H. Nutt, representing the manufacturers, and the wage committee of the Amalgamated Association resulted in the announcement that while the returns of iron shipped in the past two months did not quite come up to a 1.10c average, it had been decided by the manufacturers to make May and June wages on a 1.10c basis. This means an advance in puddling from $4 to $4.25 and an increase in finishing mill wages of 2 per cent.

THE Edward P. Allis Co., of Milwaukee, says that there is no truth in the report that it is to enter a consolidation of blast furnace machinery manufacturers.

STANDARDS FOR TESTING CAST IRON.

The following is the report of progress presented at the meeting of the American Foundrymen's Association at Pittsburg this week, by the committee named at Cincinnati last year to report upon standards for the testing of iron:

To the American Foundrymen's Association:

GENTLEMEN:—

Your committee herewith presents a report of the progress made during the past year on standardizing the testing of cast iron. It was the hope of the individual members to have some conclusions to present for action at this convention, but the phenomenal activity of the trade made it impossible to get out any more than one-third of the work in contemplation. Nevertheless the subject has been studied carefully and definite plans laid out which, if not delayed too much, should conclude the labors of your committee in time for a final report at the next convention.

It is our policy to publish results as fast as they are available, in order to make the data thus obtained serve the general trade in many ways, allow any one who wishes to do so to make his own calculations and deductions therefrom, show the constructor something of the real nature of his material, and invite other workers in this field to aid us with comment and criticism. We hope, moreover, to have emphasized the necessity of more light shed upon cast iron, in this way helping the work of our sister organizations already in the field, and thus the combined action of all investigators cannot fail to be in the highest measure valuable to the iron industry of the world.

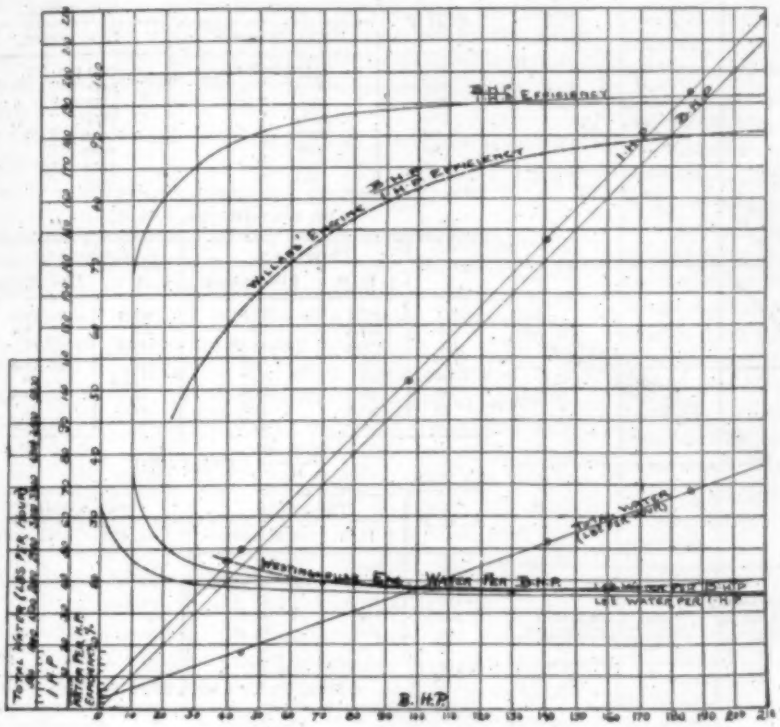
Your committee in pursuing this course of publicity presents in this report an outline of the scope of the work as originally laid out and in course of completion, adding a few remarks on the motives underlying the selection of the lines of operation adopted, and some generalization on the subject of the possible ultimate methods of testing the foundry product to satisfy consumers.

At the outset a study of existing results was undertaken, and here we were confronted with the fact that since the time when the well-known government tests were made, upon which its present specifications are still based, many changes in our views and additions to our knowledge of cast iron have taken place. The effect of chemical composition combined with physical structure is now better understood, and so we were reluctantly compelled to outline a much larger plan of operations than had been at first thought necessary. The results, will, however, doubtless help us to a better understanding of what has been done and fill many gaps now painfully evident.

To standardize the testing of cast iron it is first of all necessary to know how it behaves under conditions which can be readily duplicated in any foundry at any time. This brings us at once to the question of what cast iron is, and takes into consideration the chemical side of the problem. With iron containing a minimum to a maximum of silicon, manganese, phosphorus, sulphur and carbons, in proprotions almost defying classification, one standard test bar will exhibit all kinds of probable and improbable properties, giving little to go on except for the particular combination for which it happens to be suitable. We therefore concluded that whatever series of tests were made they would have to be repeated systematically to a greater or less extent upon the various commercial grades of castings. The twelve selected are as follows: Ingot mold iron; dynamo frame iron; light machinery iron; heavy machinery iron; cylinder iron; stove plate; gun metal chilled roll; sand roll; car wheel; novelty iron, and sash weights. Of these there are full sets of tests and only partial ones, the work being too large to go into refinements with some classes of iron which from their very nature cannot be used in but one or two ways.

We can report the completion of the first three sets of tests and the fact that two more are under way at the present time. A number of additional studies are contemplated, of which the first, on the transverse test, has been completed, and several more are under way. The magnitude of the work will be better understood when it is stated that so far there have been cast 667 test bars, furnishing 943 test pieces, 456 of which were machined, the total number of tests made being 1,015, and the aggregate weight of the material handled having been 12,270 lbs. All the available scrap was returnd to the very liberal donors in order to reduce their outlay to the greatest extent possible.

The patterns and flasks were donated by the McConway & Toley Co., Mr. Thos. D. West, and the chairman of your



LBS. WATER PER H. P. HOUR.

I. H. P.	Water.	B H P.	Water.
217.8	17.34	210	18.
207.8	17.5	200	18.2
187.3	17.55	180	18.3
167.	17.65	160	18.42
146.8	17.7	140	18.56
126.25	17 8	120	18.75
106.	17.91	100	19.
85.6	18.25	80	19.5
65 25	18.57	60	20.25
45.18	19	40	21.5
25.	10.6	20	25.75
5.	33.	10	34

TOTAL WATER. EFFICIENCY.

B. H. P.	Lbs per Hour.	B. H. P.	I. H. P.	B. H. P. / I. H. P.
210	3780	217 8	210	96.4
2 0	3640	207.8	200	96.25
18)	3290	187 3	180	96.1
16·	2950	67	160	95.9
140	2600	146 8	140	95.4
120	2250	126.25	120	95.
:00	1900	106.	100	94.5
80	1560	85 6	8)	93.5
60	1216	65 25	60	92.
40	860	45.18	40	88.75
20	515	25	20	80.
10	340	15	10	66.75

QUICK REVOLUTION STEAM ENGINES.—TRIAL MADE BY PROF. KENNEDY, NO. 497 D. E. (SUNDERLAND E. L.)

Broken line shows Westinghouse water per B. H. P. and Willan's $\frac{\text{B. H. P.}}{\text{I. H. P.}}$ efficiency as reported in Minutes of Proceedings of Institution of Civil Engineers. Vol. CXIV.

committee, who also looked after the machining of the bars, the preparation of the fractures for exhibition and the work of testing, being ably assisted by Mr. A. Pechstein, and the rest of the force in these labors.

What Tests Give the Information Desired.

The next question which arose was, "Given the various kinds of irons, to what tests shall they be subjected to get tangible results as a basis for our study?" This was settled as follows:

(1) The tensile test up to the limits of the testing machine and its clamping devices; that is, up to 4 sq. in. sections.

(2) The transverse test also up to the limits of the testing machine; that is, with 12-inch supports, the cross section to be up to 16 sq. in.

(3) The compression test on ½-inch cubes, thus allowing the smallest bars to be compared with similar portions of the larger ones.

(4) A chemical analysis of the 1-inch square dry sand bar to get an idea of the material dealt with. It is well understood that the effects of segregation (which includes the formation of graphite) will give an interesting series of chemical studies when applied to the range of test bars contemplated. These effects, however, are the direct result of the casting temperature and the rate of cooling due to size of bar and composition of melt, and while important in their bearing upon the strength of the bars under test, are rather of a scientific interest, and hence left for future investigation.

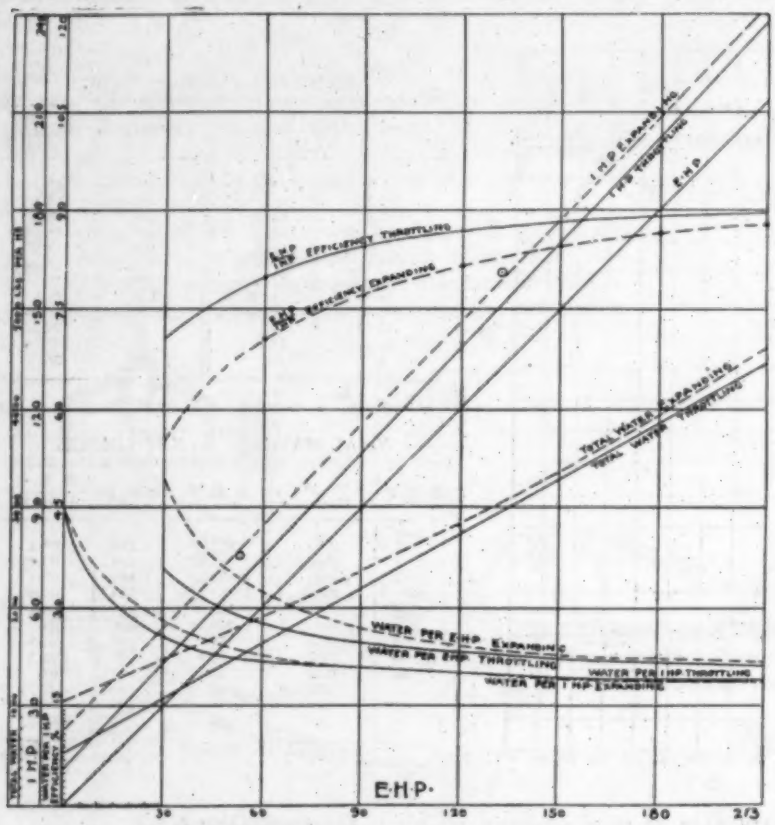
(5) It is regretted that no machinery is available for reliable impact tests, your committee deemed this method of testing a most important one, the only one in fact giving a true insight into the resistance of cast iron to shock. The future will doubtless bring this test forward more prominently, but whether in time for our work cannot yet be said. A test for hardness might also be a desirable one, and several excellent methods have been brought forward. It will be applied locally, however, each shop selecting the method best adapted to test its own work. The hardness test was therefore omitted from our list with some reluctance. A mere glance at the fractures of the bars tested will show that from the central portion outward the hardness is a regularly increasing quanity which reaches its maximum in the skin of the casting. A range of tests for hardness from center to edge might therefore be very interesting scientifically, but will hardly be essential in the drawing up of specifications. The same holds true for the shearing, punching and hammer test for cast iron.

(6) A test for fluidity in the shape of a very long narrow wedge, one face of it to be against a chill, the observation to be the manner of filling this out.

(7) A test for chilling quality on the part of the metal, the fracture of the test blocks to be photographed for record.

(8) A test for contraction. This is to be made by means of small depressions in the mold exactly 12 inches apart, a suitable instrument being provided for the purpose.

(9) Finally, if time and facilities permit, some investigations are to be made on the cooling curves of these irons, using a mirror reflection of the movements and bromide paper with the recording appartus. The microscope, it is hoped, may also reveal something of the ultimate structure of the irons thus studied.



BELLISS SELF LUBRICATING ENGINE, E. C. 10 SIZE CURVES SHOWING RESULT OF COMPARATIVE TRIALS, THROTTLING AND EXPANDING.

1. (Broken line.) With Expansion Governor in Action, i. e. Expanding.
2. (Solid line.) With Expansion Governor out of Action, i. e. Throttling.

TOTAL WATER.

E. H. P	Throttling. Lbs. Water.	Expanding. Lbs. Water.
213	4473 per h'r.	4579 per h'r.
180	3850 "	3940 "
150	3305 "	3379 "
120	2760 "	2875 "
90	2300 "	2400 "
60	1640 "	1920 "
30	1075 "	1500 "
0	520 "	1050 "

LBS. WATER PER I. H. P.

E. H. P.	Throttling. I. H. P.	Throttling. Lbs. Water.	Expanding. I. H. P.	Expanding. Lbs. Water.
213	237.5	18 8	242.5	18.8
180	202.5	19	208	18.9
150	170.5	19 38	177.5	18.9
120	139	19.8	147	19.5
90	106	20.7	115.75	20
60	75	21.8	85	22.5
30	42.5	25.2	54	27.7
0	11	47.2	23	45.6

E. H. P.
I. H. P. EFFICIENCY.

E. H. P.	Throttling. I. H. P.	Throttling. Efficiency.	Expanding. I. H. P.	Expanding. Efficiency.
213	237.5	89.6%	242.5	87.8%
180	202.5	88.8%	208	86.5%
150	170.5	88 %	177.5	84.5%
120	139	86.3%	147	81.6%
90	106	84.9%	115.75	77.7%
60	75	80 %	85	70.6%
30	42.5	70.5%	54	55.3%

LBS. WATER PER E. H. P.

E. H. P.	Throttling. Lbs. Water.	Expanding. Lbs. Water.
213	21	21.5
180	21.3	21.9
150	22	22.4
120	23	23.9
90	24.4	26.6
60	27.3	32
30	35.8	30

Supplemental Investigation.

In addition to the above rather comprehensive program, a few extra studies have become necessary in order to get some information on the testing methods themselves. Thus a series of tensile tests will be made on a number of bars varying only in their length and cast under exactly the same conditions, in order to supplement the regular results so far obtained. For this work we are indebted to the courtesy of the Pennsylvania Railroad Co., Mr. Casanave having kindly authorized the various departments interested to co-operate with your committee in the interest of the trade.

Next comes a study of the transverse test, a number of casts of bars of uniform shape and dimensions being tested with their supports at variable distance apart. These castings were kindly donated by the Frank-Kneeland Machine Co., and the tests are completed and tabulated.

The European method of making test bars comes in for some study. Mr. West has made a set of bars which will be split longitudinally to get comparative figures from the upper

and lower portions, this work, by the way, being nearly complete, and another series of these European tests, as well as a set of tests on cylinder coupons, are on the program of Pennsylvania Railroad friends.

Lines of Comparative Tests.

In arranging for the regular series of tests the following comparisons were kept in view:

(a) Differences due to the shape of the cross section of the bars; that is, round and square test bars compared. For each size, therefore, the areas were made equal as the tables already published will show.

(b) Differences due to the dimensions of the cross sections of the bars. Thus the square bars ran ½ inch, 1 inch, 1½ inches, 2 inches, 2½ inches, 3 inches, 3½ inches and 4 inches, and the round bars were equal in number.

(c) Differences due to the condition of the test bars. That is, whether rough or machined. In this line of work the machining was made rather heavier than is usual for testing purposes, and hence the delicacy of the test is somewhat impaired. Still in practice machined castings usually have much more than the mere skin taken off, hence a true comparison of machined work with rough is better exemplified in our test where ¼ inch was taken off all around from the square bars and a corresponding amount from the round ones. In this way the rough bars were cut down to the next size below, and thus a 2-inch rough bar can be compared with a 2-inch machined one, the latter being originally 2½ inch rough bar.

(d) Differences due to molds; that is, green sand castings and dry sand.

Specifications for the Bars.

The success or failure of the whole work will naturally depend upon whether the results are comparable or not, and the getting up of specifications to accomplish this gave us much concern. The final outcome of a number of plans was drawn up upon the following basis:

In a full set of bars, half are to be in green sand and half in dry sand, or cores, as the facilities of the donors allow it. Again, of all these bars, half are to be tested rough and half after machining. The transverse bars to embrace all the sizes made, and the tensile to run no heavier than the 2 inch square and round bar of equal cross section. Since the tensile bars are of a different shape than the transverse, and the lowest number of tests for a comparison must be two, each separate pattern had to furnish eight castings; that is, four in dry sand and four in green, of which two each were machined. With 24 patterns this meant 192 bars not counting the chill pieces and fluidity strips, and as it was decided that these bars must be cast at one time and in a vertical position to get comparable results, the outcome was somewhat problematical To our Mr. West was allotted the task of planning the molding and casting the first set. This he did with complete success, and the thanks of the foundry trade are due him for his disinterested work. We have next to record the generosity of the Westinghouse Electric & Manufacturing Co., who with commendable promptness gave us two complete sets of bars, the work being carried out by their Messrs. McDonald and Fuller.

The remaining sets of bars, some of which are only partial ones, have all been promised, and we hope that the very desirable activity at present the rule in all foundries may not retard the getting out of this work.

In connection with our work there is to be recorded the formation of an "American Section" of the International Society for testing materials. The American end of the great work mapped out as been entered with every promise of incalculable benefits to our growing export trade. Our association is now officially a member, and has a good individual representation besides, one of the elective offices falling to a member of your committee. The recommendation to make the study of testing methods for cast iron a separate one in the international progam was adopted unanimously, and doubtless more of this will be heard in Paris next year.

What Uniform Tests Mean to the Founder.

The results of our investigations are hardly in shape for an extended discussion at this juncture, and hence there remain only a few concluding remarks.

That consumers of castings propose to test the work they get is a fact patent to all who are in touch with the great interests in the trade. What shape this inspection will take is closely watched by the producer, who is naturally not very anxious to assist the average consumer in this matter. In some branches of the trade the consumer knows practically nothing of the nature of the material he buys, and it may be added that some producers know very little more. In other directions this is altogether different, and the producer is burdened with a lot of specifications which he knows amount to very little in giving what is really wanted. The founder does not as a rule object to the presence of an inspector, nor to rigid rules which he must follow, for he can make his price sufficiently high to cover this form of annoyance, or refuse to bid on the job. But the founder does object to be told that he must do so and so and then be held responsible if the results fail to come up to the expectations of those who drew up the specifications. So that after all the problem will be taken up by two classes; on the one hand, by those who insist on specifying for every casting and having an inspector to call for all sorts of things possible and impossible, and who will have to pay for the same; and on the other hand, by the general run of buyers who are more likely to adopt an impartial system of inspection once it is presented. Thus the government will always specify how its mortars are to be cast and have an inspector on the place. It has time enough, and pays for what it asks. The general trade, however, acts differently. Here dollars and cents and time count heavily; only with very heavy orders will it pay to send an inspector, for the great bulk of our orders are the smaller ones often repeated. Taking one of a hundred castings, and breaking it, gives only an idea as to what that particular casting is, for in a car load of castings of the same kind there may be included the work of a number of molders and a dozen heats. So that after all it will come to the test bar. The larger foundries having their laboratories and test rooms will be able to open their books for the inspection of authorized persons, possibly send along additional test bars with their shipments, and afford facilities to their customers to see that their iron is good and their castings get a fair show. The smaller foundries will simply furnish test bars upon request and the buyers will test and analyze them themselves. There will be recognized standards for the composition required in the various classes of castings, and similarly standards for their strength.

To select, then, the form of test bar and method of test best suited for each case is the work which your committee hopes to accomplish after the results of all the comparative tests now making have been exhaustively studied.

We herewith present our report of progress with the hope that the work already accomplished may bring us the further hearty support of our fellow members of the American Foundrymen's Association, as well as that of the trade at large both here and abroad. Respectfully submitted,

THOS. D. WEST,
JAS. S. STERLING,
JOS S. SEAMAN,
JOS. S. MCDONALD,
RICHARD MOLDENKE,
Chairman.

THE Chicago Junction Railway Co., Chicago, has lately located on its belt line a large elevator, with a capacity of a million and a half bushels. The elevator will be built at 106th st., on the east side of the Calumet river, by the McReynolds Elevator Co., and will be operated by Geo. S. McReynolds & Co., of Chicago. The construction will be steel and concrete, and the plant will be modern in every respect. The property covered runs from the river to the tracks of the Calumet River Railway, and is 450 feet deep. The Calumet River Railway is owned jointly by the Chicago Junction Railway Co., the Pittsburg, Fort Wayne & Chicago, tthe Michigan Central and the Chicago, Rock Island & Pacific Railways. The elevator is looked upon as being the forerunner of other large grain industries which will be located in the same district. The total cost will exceed $300,000.

THE Stirling Co.'s employes in its Barberton, O., boiler plant struck for a 2½ cents an hour increase last week and it was granted.

INDUSTRIAL SUMMARY.

[I you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

New Buyers in the Market, and Some of Their Wants:—

The Surbaugh Tool & Drill Co. has been organized at Terre Haute, Ind., to manufacture drills and mining tools. Its capital is $5,000. The officers are J. Smith Talley, of Terre Haute, president; James S. McClelland, of Brazil, Ind., vice-president; W. E. Eppert, treasurer, and J. S. Surbaugh, secretary. The company has secured the building of the Standard Range Co., and will shortly install machinery.

The Jacoby Foundry & Machine Co., Moberly, Mo., has been incorporated with capital stock of $20,000, by F. C. Jacoby, W. W. Jacoby and H. G. Crake.

Ralph Emerson, Rockford, Ill., is reported to be in the market for foundry equipment.

The Anaconda Brass Foundry Co., organized by Albert Waycott, of Albert Waycott & Co., and others, capital of $50,000, has leased the buildings and purchased the machinery, furnaces, flasks, etc., of J. W. Garratt & Co., St. Louis. The company will manufacture railroad brasses, making a specialty of car and locomotive journal-bearings.

The Greer Machinery Co., Knoxville, Tenn., wants second-hand 12 to 14-inch by seven or eight-inch-bed lathes, also one 30 by four or five-inch-bed lathe.

The Wisconsin Machinery Co., Milwaukee, Wis., is reported in want of presses, one to be of about 7,000 or 8,000 pounds of long stroke; also a double-acting press similar to the No. 68 Bliss; second-hand preferred.

The Canton, O., board of trade has secured the $8,000 bonus required by the Chilled Roll & Cast Steel Gear Co. and had entered into contract with the company to locate at Canton.

"D," who may be addressed at the office of *The Iron Trade Review*, Cleveland, desires to get into communication with manufacturers of steel single-trees, double-trees or neck yokes.

New Construction:—

It is reported that the Hercules Pipe Foundry, Anniston, Ala., recently leased by H. M. Wheeden, of Boston, will enlarge the plant. Mr. Wheeden is now in Anniston.

A Wheeling, W. Va., dispatch says that the announcement has been made authoritatively that the Wheeling Steel & Iron Co. will erect a tin plate mill and wrought iron and steel pipe and tube works.

The P. L. Kimberley plant, at Sharon, Pa., of the American Steel Hoop Co., has been closed and material transferred to another of the company's plants.

John Stumpges is building a machine shop 50x70 feet and two stories at Coon Valley, Vernon Co., Wis.

The Rock Island Road is expected to build another large shop building at Valley Junction, Ia., this year. It will be 220x160 feet and a portion of it will be used as a foundry.

An additional foundry and machine shop will be erected by the Standard Scale Co., at its Bellefonte, Pa., plant, nearly doubling capacity.

The Valley Iron Works, Williamsport, Pa., are erecting a new and complete foundry, 55x165 feet, with additions for fan and engine rooms, casting-cleaning room, rattler room, cupola house and core ovens. The plant will have two cupolas, stock elevator and traveling crane, the latter to be operated by compressed air, as will be the several special molding machines to be installed.

The Youngstown Foundry & Machine Co. has purchased a tract of land 100 feet square and expects to erect in the fall an extensive addition. The company announces that it will go into the manufacture of tin plate machinery.

Work on the 300x400-foot addition to the machine shop of the Westinghouse Electric & Mfg. Co., at East Pittsburg, will be completed early in June. It will employ 500 men.

Contracts have just been let for the erection of the Gray Iron Casting Co.'s new buildings at Mt. Joy, Pa., to replace those destroyed by fire.

At Cincinnati ground has been broken for the new tool plant of the Fosdick & Holloway Machine Tool Co., on Colerain ave. The main building will be 100 feet by 235 feet. When it gets in its new quarters the firm, which is now operating in connection with the American Tool Works Co., will greatly increase its present capacity.

The Muncie Foundry & Machine Co., of Muncie, Ind., has completely overhauled its plant, putting in modern tools. An addition of 50x125 feet is going up and the company will build special machinery of every description and do a general foundry and machine business. Several large orders are booked for early delivery. The company also will manufacture gears of all kinds.

Aberdeen, Miss., advices are that negotiations have been concluded for the establishment of a extensive machine shop in Aberdeen. Messrs. Powell & Miller of Covington, Ky., owners of the plant, agree to remove to Aberdeen in consideration of a loan by the town of $6,000 and the donation of two acres of land for the shop's site.

Work has started at Waukesha, Wis., on the Waukesha Malleable Iron Co.'s additions. An addition to the annealing department will be 64x70 feet.

The W. E. Caldwell Co., Louisville, Ky., has been granted a permit to build an $8,000 foundry.

The American Pulley Co., of Philadelphia, has purchased ground at Nicetown for the erection of a new factory, having outgrown its present quarters.

The Pawling & Harnishfeger Co., Milwaukee, Wis., has taken out a permit to erect a machine shop 127x114 feet and 50 feet high. The cost will be $20,000.

The Pullman Palace Car Co. will rebuild the repair shops and manufacturing plant, which were destroyed by fire some years ago.

Fires and Accidents:—

Fire damaged the machine shops in John Dialogue & Sons' ship yards, Camden, N. J., to the extent of $50,000. Many valuable patterns were destroyed.

A boiler explosion at the works of the New Jersey Steel & Iron Co., Trenton, N. J., May 10, injured five men—two probably fatally.

Power Equipment and Machine Tools:—

The American Tin Plate Co. has placed an order with the Westinghouse Electric & Mfg. Co., of Pittsburg, for electrical apparatus for its big plant at New Catle, Pa. The order is for a 500-kilowatt generator and a number of electric motors aggregating several hundred h. p. The motors will be used in all parts of the plant. The doubling and squaring shears, cranes, punches, tinning machines and other tin house machinery will be operated by the new system. The New Castle plant has in active operation 30 hot rolls and 26 cold rolls.

The Pressed Steel Car Co., Pittsburg, has ordered two new engines from the Westinghouse Electric & Machine Co., for its new plant at McKees Rocks. The engines will be of 400 h. p. each, and will be of the compound type. The same company will also fit up the six 250 h. p. boilers at the new plant with 12 automatic stokers.

Recent sales of Cochrane feed water heaters and purifiers are noted by the Harrison Safety Boiler Works, of Philadelphia, as follows: The Midvale Steel Co., 3,000 h. p.; Chicago Telephone Co., 300 h. p.; Peoria & Pekin Terminal Ry. Co., 600 h. p.; Coplay Cement Co., 1,250 h. p.; Swift Bros. & Co., Boston, 300 h. p.; Braman, Dow & Co., Boston, 150 h. p.; Chicago Ship Building Co., 700 h. p.; Granite City, Ill., Steel Works, 3,000 h. p.; American Tobacco Co., St. Louis, Mo., 300 h. p.; Carl Prussing Cement Co., La Salle, Ill., 100 h. p.; The Gladstone, Philadelphia, 450 h. p.; Municipal Plant, Boscobel, Wis., 150 h. p.; Tennessee Copper Co., two 150 h. p.; Spyker Bros., Amsterdam, Holland, 200 h. p.; Delaware & Hudson Canal Co., Scranton, Pa., 5,000 h. p.

The Pittsburg District:—

It is stated that Thomas Morrison, manager of the Edgar Thomson Steel Works, is introducing an innovation in the way of rolling rails direct from the ingot without re-heating the blooms. The bloom has customarily been cut into four pieces, which were re-heated before being rolled into rails.

The old Keystone Rolling Mill, on Second ave., Pittsburg, owned by the estate of James McCutcheon, is being put in shape to be operated, making skelp and light plates. Cotton ties will not be rolled. The plant formerly made these pro-

Converting a Waste Product into Bank Notes, i. e. U. S. Dollars.

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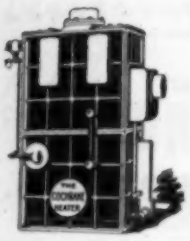

And it is all so simple that many pass it by, or else do not believe it. But the savings can be made which we have enumerated above with a COCHRANE FEED-WATER HEATER AND PURIFIER.

Because the heaters you are acquainted with wont do it, it does not follow that the "COCHRANES" can't do it.

We would like to show you how they go about it, and then you will agree with us that these very mechanical appliances are based on common sense principles—that they cannot help giving the results any more than two added to two can avoid becoming four.

All we want is your invitation to submit facts and figures.

Mfrs. of the Cochrane Separators.

HARRISON SAFETY BOILER WORKS,
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PHILADELPHIA, PA.

ducts, but has not been in operation since the latter part of 1894, except for a short run in 1895.

A petition is being circulated to have the place known as Hays Station, west of Homestead, Pa., incorporated into a borough. The territory would include what is known as West Homestead, and the holdings of the Homested Extension Co. It will be remembered the Mesta Machine Co., is erecting a large plant in this locality.

The Carnegie Steel Co. has over 400 bricklayers at work on the ten 50-ton basic open-hearth steel furnaces being erected on the recently purchased tract of land formerly occupied by the Howard Plate Glass Works.

The Pittsburg Machine Tool Co., Park Building, Pittsburg, recently incorporated with $250,000 capital stock, will erect a plant at the corner of Lacock and Darragh sts., Allegheny. The machinery will be furnished by the U. Baird Machinery Co.

The recently formed Pittsburg Steel Foundry Co. has elected the following officers: President, Stewart Johnson; vice-president, J. M. Lockhart; secretary and treasurer, Jas. J. Donnell. These will constitute the board of directors, along with Wallace Rowe, and William P. McKelvy.

The new bar iron mill at the Sable Iron Works, Pittsburg, was started on double turn, with 16 heats per day this week. This is the first time within five years that this mill has been placed on double turn. The sheet mill at the plant was closed down Saturday for four weeks, during which new sheet mill will be erected.

Concerning the entrance of the W. Dewees Wood Co.'s plants into the sheet mill consolidation it is stated that the Wellsville mill will be purchased outright, and a special agreement will be made in connection with the acquisitions of the McKeesport mills. It is proposed to exclude the planished iron department from the deal.

The old Soho furnace, Pittsburg, formerly owned by the Moorehead-McCleane Co., and operated for the last three years by Laughlins & Co., limited, was purchased at receiver's sale last week by attorneys representing Laughlins & Co., Ltd., for $80,000. The property consists of one stack, with a daily capacity of about 300 tons of pig iron, a casting house, and about 10 acres of ground. The sale was made subject to a mortgage of $343,594.78, including accrued interest, held by the New York Life Insurance Co. The estate of the late Col. James Andrews, of Allegheny, had claims against the property of $70,000 or $80,000. J. G. Butler, Jr., of Youngstown, and O. D. Thompson, Pittsburg, were bidders.

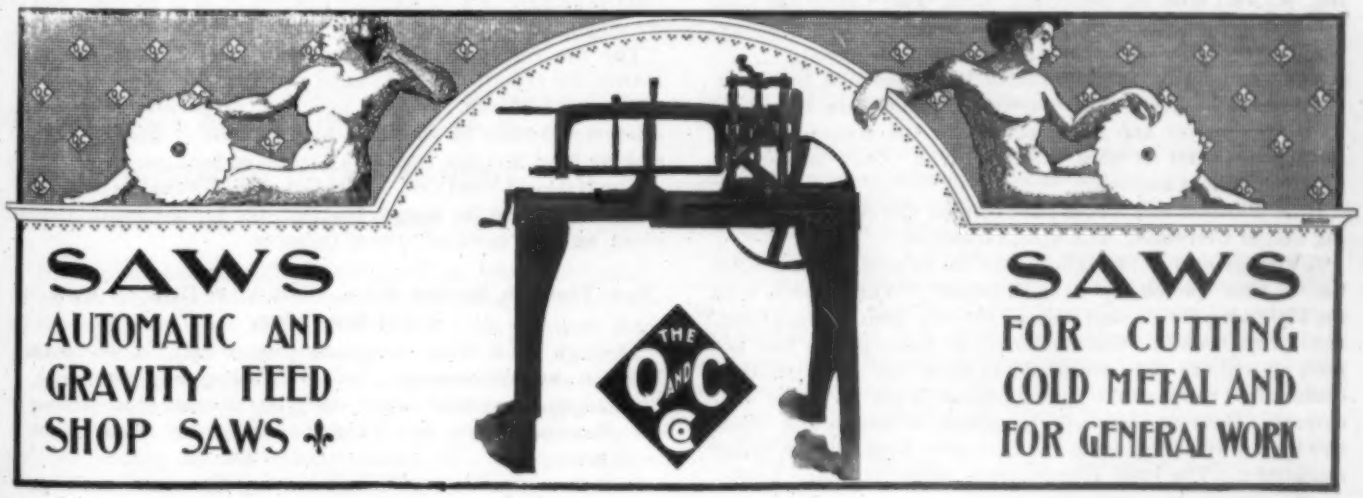
It is understood that the National Tube Works Co., McKeesport, Pa., will not blow out its Monongahela furnaces this summer, as was intended, owing to the rush of business.

It is now stated, contrary to the recent report, that the different Wood mills will be taken into the sheet consolidation. The mills in the east and at Wellsville, O., are to be sold direct, while a division is to be made of the plant at McKeesport, Pa., so that the department making the famous planished iron will be kept as a separate organization, which will be operated in harmony with the consolidation, the balance of the plant being taken in.

The Totten & Hogg Iron & Steel Foundry Co., of Pittsburg, manufacturers of engines and rolling mill machinery, is now building a Garrett rod mill for the Alabama Steel & Wire Co., of Birmingham, Ala. It is also building machinery for the new tube mill for the Atlantic Tube Co., which is being erected at Beaver Falls, Pa.

General Industrial Notes :—

Jas. Bonar & Co., Carnegie Building, Pittsburg, Pa., report orders for Pittsburg feed water heater and purifiers for shipment to the following parties: Herman Kreis, Knoxville, Tenn., 200 h. p.; Oliver Wire Works, Pittsburg, Pa., 150 h. p.; Duquesne Forge Co., Rankin, Pa., 800 h. p.; J. M. Denholm & Son, Pittsburg, Pa., 200 h. p.; Pittsburg Horse Shoe Co., Glassport, Pa., 600 h. p.; Baker Forge Co., Ellwood City, Pa., 200 h. p.; York Mfg. Co., York, Pa., 160 h. p.; Pittsburg Brick Co., Briggston, Pa., 200 h. p.; Jas. H. Baker Mfg. Co., Tarentum, Pa., 250 h. p.; Danville Artificial Ice Co., New Orleans, La., 160 h. p. They also are furnishing Sweet's steam separators to the following: The Ella Furnace, West Middlesex, Pa.; The Wheeling & Elm Grove Ry. Co., Whee



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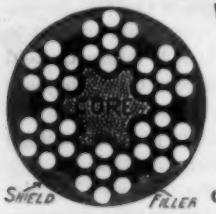

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ing, W. Va.; Geo. H. Behrends, Erie, Pa.; California Coal Co., California, Pa.; Cleveland, Lorain & Wheeling Railway, Lorain, O. Business on their specialties is also good.

The Centrifugal Pump Works, of Irvin Van Wie, Syracuse, N. Y., have been running overtime to take care of orders. Two large pumps are being shippd to the American Steel Barge Co.'s plant at West Superior, Wis. Their capacity is 3,000,000 gallons an hour.

H. S. Blossom and others have formed the Standard Welding Co., of Cleveland, with $500,000 capital.

A Youngstown, O., stockholder in the Republic Iron & Steel Co. is thus quoted by a local paper: "The trouble with the Mahoning Valley and Brown-Bonnell Iron Co.'s plants, has always been that the machinery in these plants has not been up-to-date. The stockholders have not felt that they could afford to spend the money needed to put in better machinery. But now there will be plenty of money and these two mills will undoubtedly be equipped with all the latest machinery. The steel consolidation wants to make a contract to furnish us with steel for a period of 10 or 20 years, but we may have a steel plant of our own."

The net earnings of the Colorado Fuel & Iron Co., in March, are reported at $92,894.30 and for the nine months ending with March, $790,937.49. The proportion of bond, interest and taxes for the same nine months is $327,465, and sinking fund, $35,000, leaving a surplus of $428,472.49

The National Steel Co., it is reported, has bought 110 acres of land adjoining its Mingo Junction, O., furnaces and steel plant, and will build additional furnaces.

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Midsummer Outing Trip to the Ocean via Pennsylvania Lines.

Persons in quest of a delightful haven at which to spend their summer vacation will be interested in the announcement that special excursions to the seashore will be run over the Pennsylvania Lines Thursday, August 10th.

During the past two seasons low rate excursions over this direct through route to the ocean carried many happy people from points in Indiana and Ohio to ten of the most attractive seaside resorts on the Atlantic coast, viz.: Atlantic City, Cape May, Anglesea, Avalon, Holly Beach, Ocean City, Sea Isle City, Wildwood, New Jersey, Rehoboth, Del., and Ocean City, Md.

The excursions for the summer of 1899 will again afford opportunity to enjoy refreshing ocean bathing and sailing, the invigorating sea air, and the myriads of attractions for which the seaside is famous.

Excursion tickets will be sold to the ten charming resorts mentioned. It will be an excellent chance for a pleasure trip to the sea. The time, mid-summer, is the season for outings, and the places are particularly rich in attractions for the summer idler. The fare will be exceptionally low, and the return limit privileges will cover the customary ten day's vacation. Anyone wishing to participate in this highly enjoyable trip to the seashore may arrange to do so by communicating with C. L. Kimball, Assistant General Passenger Agent, Cleveland, O.

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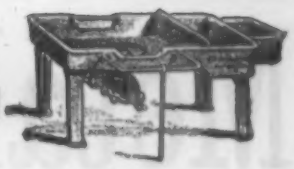

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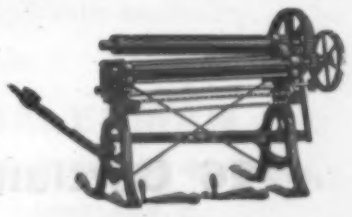

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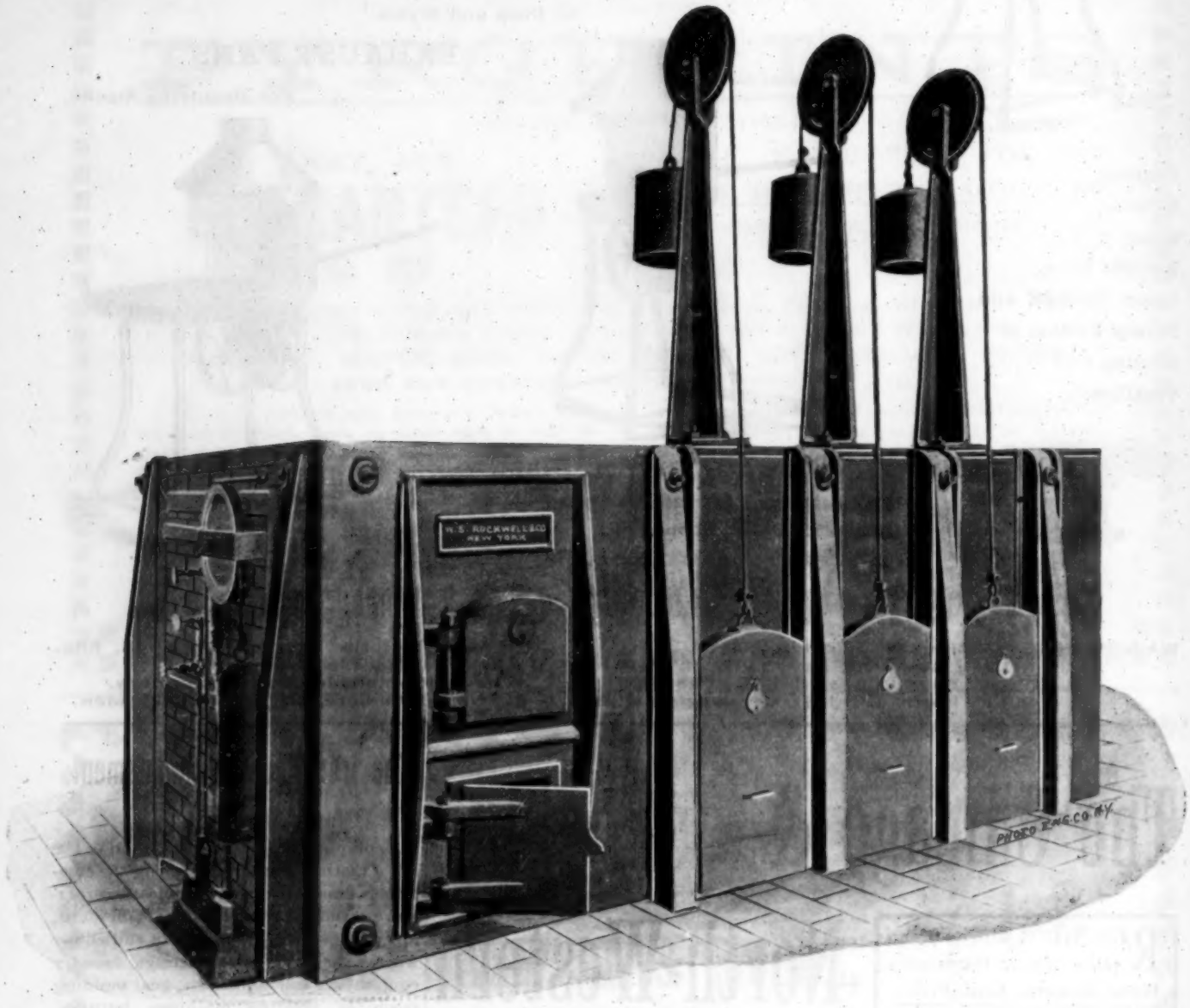

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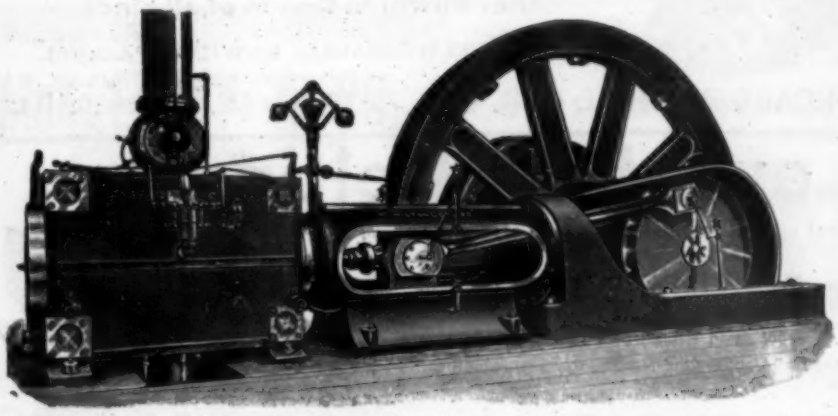

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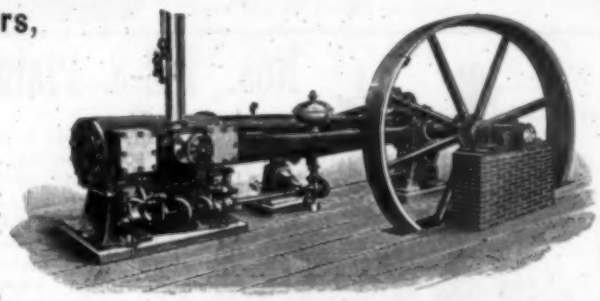

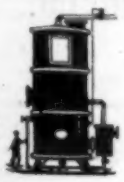

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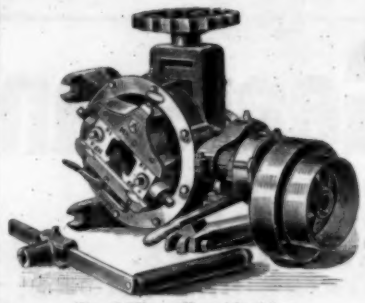

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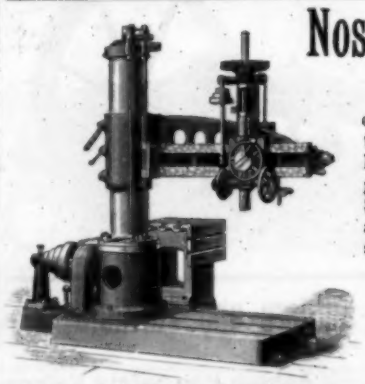

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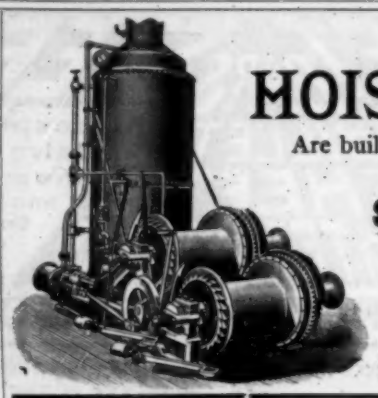

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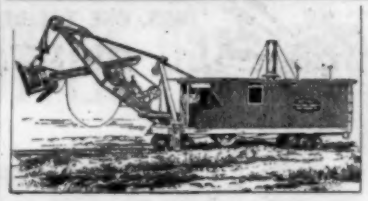

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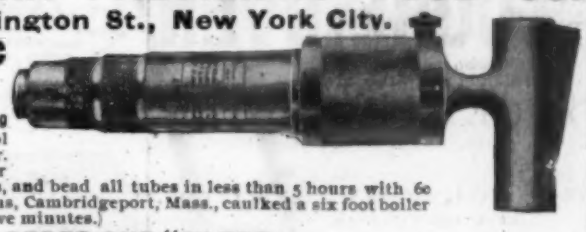

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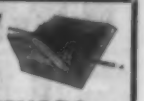

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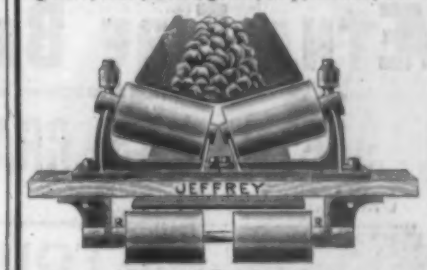

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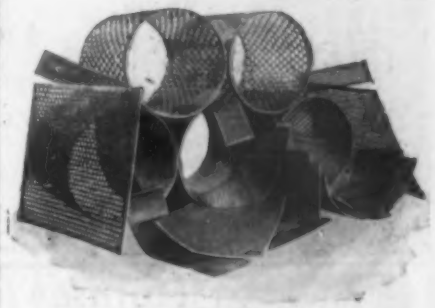

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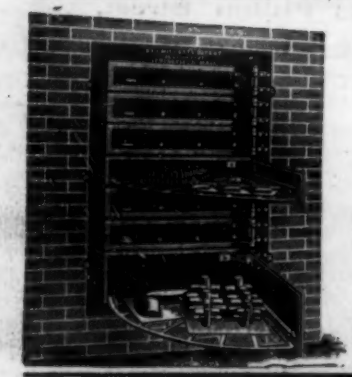

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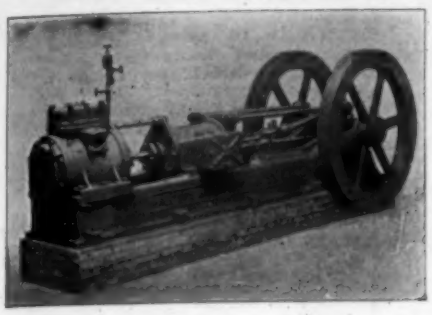

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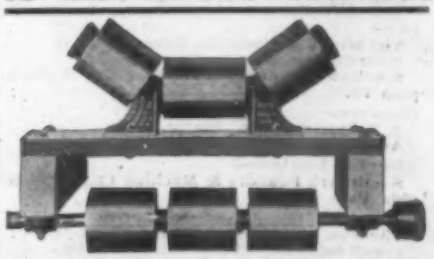

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Fuel Oil Burners—
W. S. Rockwell & Co., New York City.
American Gas Furnace Co., New York City.
Galvanized Iron—
Apollo Iron & Steel Co., Pittsburg, Pa.
Galvanizers—
Ætna-Standard Iron & Steel Co., Bridgeport, O.
Apollo Iron & Steel Co., Pittsburg, Pa.
Galvanizing Pots—
The Wm. B. Pollock Co., Youngstown, O.
Gas Burners—
American Gas Furnace Co., New York City.
Gas Furnaces—
American Gas Furnace Co., New York City.
Gearing.
I. & E. Greenwald Co., Cincinnati, O.
The R. D. Nuttall Co., Allegheny, Pa.
The Van Dorn & Dutton Co., Cleveland, O.
Gear Cutting—
The R. D. Nuttall Co., Allegheny, Pa.
Brainard Milling Machine Co., Hyde Park, Mass.
The Van Dorn & Dutton Co., Cleveland, O.
Gear Cutters—
Brainard Milling Machine Co., Hyde Park, Mass.
Gear Lubricants—
The Ironsides Company, Columbus, O.
Grease—
A. F. Boettcher, Rowlands, Pa.
Grindstones—
C. H. Besly & Co., Chicago, Ill.
Graphite Paint—
Jos. Dixon Crucible Co., Jersey City N. J.,
Grate Bars—
Geo. B. Sennett Co., Youngstown, Ohio.
Gray Iron Castings—
W. A. Jones Foundry Co., Chicago, Ill.
The Lane & Bodley Co., Cincinnati, O.
Brass Founders' Supply Co., Newark, N. J.
Hack Saws—
Millers Falls Co., New York City.
Q & C Co., Chicago, Ill.
Hangers—
E. A. Delano, Chicago, Ill.
Dodge Mfg. Co., Mishawaka, Ind.
The Aultman Co., Canton, O.
Jones & Laughlins, Ltd., Pittsburg, Pa.
I. & E. Greenwald Co., Cincinnati, O.
Harness Snaps—
Covert Mfg. Co., West Troy, N. Y.
Hoists—
Edwin Harrington Son & Co., Philadelphia.
Reading Crane & Hoist Works, Reading, Pa.
The Lane & Bodley Co., Cincinnati, O.
The Aultman Co., Canton, O.
Lidgerwood Mfg. Co., New York City.
Heaters and Purifiers—
Harrison Safety Boiler Works, Philadelphia.
Stilwell-Bierce & Smith-Vaile Co., Dayton O.
James Bonar & Co., Pittsburg, Pa.
We Fu Go Co., Cincinnati, O.
Heating and Ventilating Apparatus
B. F. Sturtevant Co., Boston.
Heavy Hardware—
C. H. Besly & Co., Chicago, Ill
Parkhurst & Wilkinson Co., Chicago, Ill.
Hoisting Engines—
The Edward P. Allis Co., Milwaukee, Wis.
Earle C. Bacon, New York City.
The Lane & Bodley Co., Cincinnati, O.
Lidgerwood Mfg. Co., New York City.
The Aultman Co., Canton, O.
Webster, Camp & Lane Machine Co., Akron, O.
Excelsior Iron Works Co., Cleveland, O.

Hoisting Machinery—
Link-Belt Machinery Co., Chicago, Ill.
Reading Crane & Hoist Works, Reading, Pa.
Jeffrey Mfg. Co., Columbus, O.
The Lane & Bodley Co Cincinnati, O.
Excelsior Iron Works Co., Cleveland, O.
Earl C. Bacon, New York City.
Lidgerwood Mfg. Co., New York City.
Heyl & Patterson, Pittsburg, Pa.
The Aultman Co., Canton, O.
The Brown Hoisting and Conveying Machine Co., Cleveland, O.
Webster, Camp & Lane Machine Co., Akron, O.
Robins Conveying Belt Machine Co, New York City.
Horse Shoes—
Phoenix Horse Shoe Co., Joliett, Ill.
Hotels—
United States Hotel Co., Cleveland, O.
Hydraulic Machinery—
Stilwell-Bierce & Smith-Vaile Co., Dayton, O.
Injectors—
C. H. Besly & Co., Chicago, Ill
Manning, Maxwell & Moore, New York City.
Insurance Companies—
Hartford Steam Boiler I. & I. Co., Hartford, Ct.
Iron Buildings—
Shiffler Bridge Co., Pittsburg, Pa.
Riter-Conley Co., Pittsburg, Pa.
Iron Nails and Steel—
Bethlehem Iron Co., South Bethlehem, Pa.
C. H. Besly & Co., Chicago, Ill
E. H. Stroud & Co., Chicago, Ill.
Parkhurst & Wilkinson Co., Chicago, Ill.
Iron and Steel Roofing—
Berger Mfg. Co., Canton, O.
Ætna-Standard Iron & Steel Co., Bridgeport. O
Iron Ore—
Lake Superior Consolidated Iron Mines New York City, N. Y.
Oglebay, Norton & Co., Cleveland, O.
M. A. Hanna & Co., Cleveland, O.
Drake Bartow & Co., Cleveland, O.
Pickands, Mather & Co., Cleveland, O.
Iron Working Tools—
H. Bickford, Lakeport, N. H
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We Fu Go Co., Cincinnati, O.
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Bourne-Fuller & Co., Cleveland, O.
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Merchant & Co., Inc., Philadelphia, Pa.
Swarts Metal Refining Co., Chicago, Ills.
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Molders' Tools—
The S. Obermayer Co., Cincinnati, O.
Name Plates—
August Becker, Boston, Mass.
Nickel Plating Outfits—
Northampton Emery Wheel Co., Chicago, Ill.
Nuts and Bolts
Upson Nut Co., Cleveland, O.
Office Rearings—
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Oil Burners—
W. S. Rockwell & Co., New York City
American Gas Furnace Co., New York City.
Oil Cups—
C. H. Besly & Co., Chicago, Ill.
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Harrington & King Per. Co., Chicago, Ill.
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Aitchison Perforated Metal Co., Chicago, Ill.
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Clinton Iron & Steel Co., Pittsburg.
Forster, Waterbury & Co., Chicago, Ill.
Bourne-Fuller Co. Cleveland, O.
M. A. Hanna & Co., Cleveland, O.
E. H. Stroud & Co., Chicago, Ill.
F. B. Stevens, Detroit, Mich.
McKeefrey & Co., Leetonia, O.
Superior Charcoal Iron Co., Grand Rapids, Mich
Hickman & Williams, Chicago, Ill.
Spearman Iron Co., Sharpsville, Pa.
The Brier Hill Coal & Iron Co., Youngstown, O.
Pickands, Mather & Co., Cleveland, O.
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Union Boiler Tube Cleaner Co., Pittsburg, Pa.
Pipe Covering—
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Jenkins Bros., New York City.
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Bickford Drill & Tool Co., Cincinnati, O.
Danielson Machine & Tool Co., Cleveland, O
Manning, Maxwell & Moore, New York City.
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Plumbago—
The S. Obermayer Co., Cincinnati, O.
Plumbers and Gas Fitters' Supplies—
C. H. Besly & Co., Chicago, Ill.
Pneumatic Appliances—
Clayton Air Compressor Works, New York.
Pneumatic Tools.—
American Pneumatic Tool Co., New York City
Q & C Co., Chicago, Ill.
Portable Forges—
C. H. Besly & Co., Chicago, Ill.
B. F. Sturtevant Co., Boston, Mass.
Vulcan Mfg. Co., Pittsburg, Pa.
Power Drop Hammers—
Baush & Harris Machine Tool Co., Springfield Mass.
Power Presses—
Bertsch & Co., Cambridge City, Ind.
Fox Machine Co., Grand Rapids, Mich.
E. Konigslow & Bro. Cleveland, O.
Danielson Machine & Tool Co., Cleveland, O.
Power Transmission Machinery—
Jeffrey Mfg. Co., Columbus, O.
The Lane & Bodley Co., Cincinnati, O.
E. A. Delano, Chicago, Ill.
Dodge Mfg. Co., Mishawaka, Ind.
The Aultman Co., Canton, O.
Jones & Laughlins, Ltd., Pittsburg, Pa.
I. & E. Greenwald Co., Cincinnati, O.
Presses—
Bertsch & Co., Cambridge City, Ind.
C. H. Besly & Co., Chicago, Ill.
E. Konigslow & Bro. Cleveland, O.
Danielson Machine & Tool Co., Cleveland, O.
Pressure Gauges—
The Bristol Co., Waterbury, Conn.
Pulleys—
W. A. Jones Foundry Co., Chicago, Ill.
The Lane & Bodley Co., Cincinnati, O.
E. A. Delano, Chicago, Ill.
Dodge Mfg. Co., Mishawaka, Ind.
The Aultman Co., Canton, O.
Jeffrey Mfg. Co., Columbus, O.
Jones & Laughlins, Ltd., Pittsburg, Pa
I. & E. Greenwald Co., Cincinnati, O.
Pumps (Steam)—
The Edward P. Allis Co., Milwaukee, Wis

Stilwell-Bierce & Smith-Vaile Co., Dayton, O.
Blakeslee Mfg. Co., Du Quoin, Ill.
Fred M. Prescott Steam Pump Co., Milwaukee Wis.
Hall Steam Pump Co., Pittsburg, Pa.
Southwark Foundry & Machine Co., Philadelphia, Pa.

Punches—
R. Konigslow & Bro. Cleveland, O.

Pyrometers—
Edward Brown, Philadelphia, Pa.
Vulcan Mfg. Co., Pittsburg, Pa.

Railway Supplies—
Cleveland City Forge & Iron Co., Cleveland, O.
Garden City Sand Co., Chicago, Ill.

Rivets—
Champion Rivet Co., Cleveland, O.
Jones & Laughlins, Ltd., Pittsburg, Pa.

Riveted Steel Pipe—
The Wm. B. Pollock Co. Youngstown, O.

Rock Drills—
Rand Drill Co., Chicago, Ill.
The Ingersoll-Sergeant Drill Co., New York.

Rolling Mill Machinery.
Totten & Hogg Iron and Steel Foundry Co., Pittsburg, Pa.
F. R. Phillips' Sons Co., Philadelphia, Pa.

Roofs—
Shiffler Bridge Co., Pittsburg.
Riter-Conley Mfg. Co., Pittsburg, Pa.

Sand and Chill Rolls—
Seaman, Sleeth Co., Pittsburg, Pa.

Saws—
Peter Gerlach & Co., Cleveland, O.

Screens for Coal Ore, Etc.
Robt. Aitchison Perforated Metal Co., Chicago.
Harrington & King Perforating Co., Chicago.
Jeffrey Mfg. Co., Columbus, O.
The Aultman Co., Canton, O.
Fraser & Chalmers, Chicago, Ill.

Screws—
C. H. Besly & Co., Chicago, Ill.
Upson Nut Co., Cleveland, O.
Chicago Screw Co., Chicago, Ill

Seamless Tubes—
Shelby Steel Tube Co., Cleveland, O.

Shafting—
The Lane & Bodley Co., Cincinnati, O.
R. A. Delano, Chicago, Ill.
Dodge Mfg. Co., Mishawaka, Ind.
Fitzsimmons & Co., Cleveland, O.
The Aultman Co, Canton, O.
Jeffrey Mfg. Co., Columbus, O.
Jones & Laughlins, Ltd., Pittsburg, Pa
I. & E. Greenwald Co., Cincinnati, O.

Shapers—
Baush & Harris Machine Tool Co., Springfield, Mass.
Fox Machine Co., Grand Rapids, Mich.

Shearing and Punching Machinery –
Bertsch & Co., Cambridge City, Ind.
Fox Machine Co., Grand Rapids, Mich.
Danielson Machine & Tool Co., Cleveland, O.

Sheet Iron—
Cleveland Rolling Mill Co., Cleveland, O.
Ætna-Standard Iron & Steel Co., Bridgeport, O.
R. H. Stroud & Co., Chicago, Ill.

Ship Yards—
Wm. Cramp & Sons, Philadelphia, Pa.

Special Machinery—
Edwin Harrington Son & Co., Philadelphia.
Q & C Co., Chicago, Ill.
The Aultman Co., Canton, O.
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R. Konigslow & Bro. Cleveland, O.
Wheeling Mold & Foundry Co., Wheeling, W. Va.
Danielson Machine & Tool Co., Cleveland, O.

Stand Pipes—
The Wm. B. Pollock Co., Youngstown, O.

Steam Boiler Inspectors—
Hartford Steam Boiler Inspection & Insurance Co., Hartford, Conn.

Steam Pipe and Boiler Covering—
C. H. Besly & Co., Chicago Ill.

Steam Packing –
C. H. Besly & Co., Chicago, Ill.

Steam Pumps—
Hall Steam Pump Co., Pittsburg, Pa.
Stilwell-Bierce & Smith-Vail Co., Dayton, O.
Blakeslee Mfg. Co., Du Quoin, Ill.
Fred. M. Prescott Steam Pump Co., Milwaukee, Wis.
Edw. P. Allis Co., Milwaukee, Wis.
Southwark Foundry and Machine Co., Philadelphia, Pa.

Steam Shovels and Dredges—
Marion Steam Shovel Co., Marion, O.
The Bucyrus Co., South Milwaukee, Wis.

Steam Specialties—
C. H. Besly & Co., Chicago, Ill.

Steel—
Otis Steel Co., Cleveland, O.
R. H. Stroud & Co., Chicago, Ill.
Bræburn Steel Co., Bræburn, Pa.
Crescent Steel Co., Pittsburg, Pa.
La Belle Steel Co., Pittsburg, Pa.
The Morris & Bailey Steel Co., Pittsburg, Pa.
Sanderson Bros. Steel Co., Cleveland, O.
Byron H. White, Chicago, Ill.

Steel Castings—
Otis Steel Co., Cleveland, O.
Q & C Co., Chicago, Ill.

Steel Plants—
The Wm. B. Pollock Co., Youngstown, O.
The Riter-Conley Co., Pittsburg, Pa.

Steel Blooms and Billets—
Cleveland Rolling Mill Co., Cleveland.
Bethlehem Iron Co., South Bethlehem, Pa.
Ohio Steel Co., Youngstown, Ohio.
The Lorain Steel Co., Lorain, O.
Jones & Laughlins, Ltd., Pittsburg, Pa.

Steel Stamps and Stencils—
J. H. Fleharty & Co., Cleveland, O.

Steel Tubes—
Shelby Steel Tube Co., Cleveland, O.

Stokers—
Playford Stoker Co., Cleveland, O.

Tanks—
Enterprise Boiler Co., Youngstown, O
Meehan Boiler & Construction Co., Lowellville Ohio.
The Wm. B. Pollock Co., Youngstown, O.
Riter-Conley Mfg. Co., Pittsburg, Pa.
The Aultman Co., Canton, O.

Tank Cars—
The Wm. B Pollock Co., Youngstown, O

Tin and Terne Plates—
R. H. Stroud & Co., Chicago, Ill
American Tin Plate Company, Chicago, Ill.

Tin Plate Machinery.
Totten & Hogg Iron and Steel Foundry Co., Pittsburg, Pa.
F. R. Phillips' Sons Co., Philadelphia, Pa.

Tool Steel—
C. H. Besly & Co., Chicago, Ill.
Bræburn Steel Co., Bræburn, Pa.
Crescent Steel Co., Pittsburg, Pa.
La Belle Steel Co., Pittsburg, Pa.
Sanderson Bros. Steel Co., Cleveland, O.

Transmission Machinery—
Heyl & Patterson, Pittsburg, Pa.
Link-Belt Machinery Co., Chicago, Ill.
The Lane & Bodley Co., Cincinnati, O.
W. A. Jones Foundry & Machine Co., Chicago, Ill
Jeffrey Mfg. Co., Columbus, O
Dodge Mfg. Co. Mishawaka, Ind.
The Aultman Co., Canton, O.
Brown Hoisting and Conveying Machine Co., Cleveland, Ohio.

Tubes—
National Tube Works, McKeesport, Pa.
Shelby Steel Tube Co, Cleveland, O.

Tube Cleaners.
Union Boiler Tube Cleaner Co., Pittsburg, Pa.

Tube Welding
S. Fix Sons, Cleveland, O.

Tumbling Mills—
The S. Obermayer Co., Cincinnati, O.

Turnbuckles—
Cleveland City Forge & Iron Co., Cleveland, O.

Twist Drills—
C. H. Besly & Co., Chicago, Ill.

Twist Drill Cases—
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Valves—
C. H. Besly & Co., Chicago, Ill.
Jenkins Bros. New York City
Manning, Maxwell & Moore, New York City.

Ventilating Fans—
B. F. Sturtevant Co., Boston Mass.

Vises—
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Water Softening Plant—
We Fu Go Co., Cincinnati, O.

Wire Coating.
The Ironsides Company, Columbus, O.

Wire Filler.
The Ironsides Company, Columbus, O.

Wire Machinery—
The F. B. Shuster Co., New Haven, Conn.
S. W. Goodyear, Waterbury, Conn.

Wire Nails—
Cleveland Rolling Mill Co., Cleveland, O.

Wire Rope Coating.
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*Superior Charcoal Iron Co	1-35
Swarts Metal Refining Co	—
Tabor Mfg Co	1
Textor, O	32
Tod, Wm. & Co	2
Totten & Hogg Iron and Steel Foundry Co	39
Union Mining Co	42
Union Boiler Tube Cleaner Co	32
United States Hotel Co	1
Upson Nut Co	39
Van Dorn & Dutton Co	1
Vulcan Mfg. Co	37
Washington Coal and Coke Co	30
Webster, Camp & Lane Machine Co	33
Webster Fire Brick Co	23
We Fu Go Co	1
Wheeling Mold & Foundry Co	31
White, Byron H	44
Wyman & Gordon	37
	43

BRÆBURN STEEL COMPANY, Bræburn, Pa.
MANUFACTURERS OF
FINE TOOL STEEL AND FORGINGS. ALSO SPRING HAMMER, AND MACHINERY STEEL OF HIGH QUALITY. FINE OPEN-HEARTH STEEL.

DIRECTORS:
Wm. Metcalf,
Chas. Metcalf,
P. B. Hasbrouck,
R. P. Kelly,
Sec'y. and Treas.

MORE WEAR from your tools
.....Almost no **STEEL EXPENSE**
NO TROUBLE

"It pays to use the most reliable tool steel in the market."

SANDERSON BROS. STEEL CO.
Cleveland Warehouse, 97 Water St.

CRESCENT STEEL
ESTABLISHED 1865 ✦ INCORPORATED 1888.
CRESCENT STEEL CO.
480 PEARL ST. NEW YORK — PITTSBURGH, PA. — 64 & 66 S. CLINTON ST. CHICAGO.

La BELLE STEEL CO., Pittsburgh, Pa.
MANUFACTURERS OF FINE
CRUCIBLE CAST TOOL STEEL.
SPECIAL GRADES FOR ALL PURPOSES.
BYRON H. WHITE,
Western Selling Agent.
OFFICE AND WAREHOUSE: **68 and 70 South Canal St., Chicago.**

BYRON H. WHITE, Western Selling Agent,
68-70 South Canal St., Chicago.

THE MORRIS & BAILEY STEEL CO.
COLD ROLLED STRIP STEEL
FLAT & COILED FOR STAMPING DRAWING BLANKING SPRINGS ETC
BYRON H. WHITE
PITTSBURG, PA.

BYRON H. WHITE, Western Selling Agent, CHICAGO.

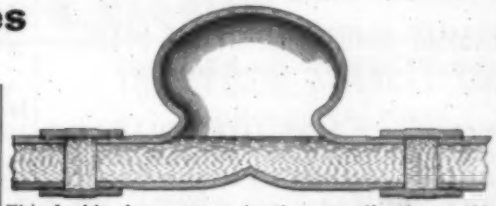
Don't Waste Money in Your Pattern Shop.
THE GOBEILLE PATTERN CO., Cleveland.

Burst Water Pipes
A Thing of the Past.

You can now make all water pipes as secure from bursting in winter as in summer. This pneumatic system is the only one which successfully prevents the annoying and costly bursting of water pipes. It has solved a great economic problem. Highly indorsed by architects, engineers and municipal officials.

No new house should be completed without this system, and all house owners should avail themselves of this "ounce of prevention" in season.

Send for illustrated booklet, giving full explanation.



This double slope causes the expanding ice to slide into the air dome taking the strain off the pipe. The air cushion also prevents "hammering." Covered by United States and Foreign Patents.

LIBERAL DISCOUNT TO THE TRADE.

THE PNEUMATIC DOME MFG. CO.,
506 E Street, N. W., Washington, D. C.

BRASS FOUNDERS FINISHERS J. J. RYAN & CO.
6874 West Monroe St., Chicago.
Best Bronze, Babbitt Metals, Brass and Aluminum CASTINGS On Short Notice.

IRON AND STEEL MARKETS.

IRON ORE.

[On Lake Erie docks.]

Special low-phosphorus hard Ore, Bessemer	$3.75
No. 1 Specular, Bessemer	$3.15@3.30
No. 1 Bessemer hematite	3.75@3.85
Hematites No. 1 non-Bessemer	1.90@2.10
No 1. Specular, non-Bessemer	2.00@2.40
Mesabi Bessemer	1.80@2.00

PIG IRON.

CLEVELAND (f. o. b. cars):	
Bessemer	$15 15
No. 1 Strong Foundry	$15 65@16 00
No. 2 Strong Foundry	15 15@15 40
Gray Forge, red short	14 65
Gray Forge, neutral	14 40
No. 1 American Scotch	15 75@16 00
No. 2 American Scotch	15 40@15 65
Lake Superior Charcoal	16 50@17 00
PITTSBURG:	
No. 1 Foundry	$15 75@16 00
No. 2 Foundry	15 50@15 75
Gray Forge	14 25@14 50
White and Mottled	13 50
Warm Blast Charcoal	15 00@17 00
Cold Blast Charcoal	22 00@26 00
Bessemer	15 15@15 25
CHICAGO:	
Lake Superior Charcoal	$17 00@$18 00
Local Coke Foundry No. 1	15 50@15 75
Local Coke Foundry No. 2	15 00@15 50
Local Coke Foundry No. 3	14 50@14 75
Local Scotch Foundry No. 1	15 50@15 75
Local Scotch Foundry No. 2	15 00@15 50
Local Scotch Foundry No. 3	14 50@14 75
Southern Coke No. 1	16 00@16 25
Southern Coke No. 2	15 25@15 75
Southern Coke No. 3	14 75@15 00
Southern No. 1 Soft	15 50@16 00
Southern No. 2 Soft	15 00@15 50
Southern Silveries	15 50@16 00
Jackson Co. Silveries	17 00@18 00
Ohio Silveries No. 1	.....
Ohio Strong Softeners	15 50@16 50
Alabama Car Wheel	17 50@18 00
Malleable Bessemer	15 50@16 00
Coke Bessemer	15 50@16 00
CINCINNATI (reported by Rogers, Brown & Co.	
Southern Coke No. 1, Foundry	$14 75@15 25
Southern Coke No. 2 and No. 1 Soft	14 25@14 75
Hanging Rock Charcoal No. 1, Fdy	17 00@18 00
Tennessee Charcoal No 1	15 00@16 00
Jackson County Silvery No 1	16 00@16 25
Southern Coke, Gray Forge	12 75@13 00
" " Mottled	12 75@13 00
Standard Georgia Car Wheel	15 50@16 00
Lake Superior " "	15 50@16 00
BUFFALO:	
No. 1 Foundry Strong Coke Iron Lake Superior Ore	$14 25
No. 2 Foundry Strong Coke Iron Lake Superior Ore	13 75
Ohio Strong Softener No. 1	14 00
Ohio Strong Softener No. 2	13 50
Jackson Co. Silvery No. 1	15 60
Southern Soft No. 1	15 25
Southern Soft No. 2	14 75
Lake Superior Charcoal	14 00@14 50
Coke, Malleable	14 10
ST. LOUIS:	
Southern Coke No 1	$14 75
Southern Coke No. 2	14 25
Southern Coke No. 3	13 75
Southern Coke No. 4	13 55
Southern Gray Forge	13 20
Tennessee Charcoal No 1	13 75
Jackson County 2 per cent Silicon	16 25
Lake Superior Coke No. 1	15 00@16 00
Lake Superior Charcoal	15 25@16 25
Genuine Connellsville Coke	4 25
West Virginia Coke	4 10

OLD RAILS AND SCRAP METAL.

[Delivered Cleveland.]	Gross Tons
Old iron rails	$18 00
Old steel rails (6 ft. and over)	14 00
Old steel rails (6 ft. and under)	14 00
Old car wheels	16 00
	Net Tons
No. 1 R. R. wrought scrap	$16 50
Mill scrap	11 50
No. 1 Machine cast scrap	12 50
Iron axles	19 00
Axle turnings	11 00
Wrought turnings (free from cast)	10 00
Cast borings	7 50
Uncut wrought iron boilers	7 00
Steel boiler plates	11 00
Grate bars	8 00
Pipes and flues (clean)	10 00
Tank iron	12 00
Hoop and band iron	9 00
Sheet iron	8 00
Wrought drillings	10 00
Malleable iron	10 50

STRUCTURAL MATERIAL.

Beams and Channels (f. o. b. Cleveland)	1.50c
Angles	1.50c
Tees	1.50c
Universal Plates	1.80@1.90c
Sheared Plates	1.90c

MERCHANT IRON AND STEEL.

[Less than car-lots, Cleveland.]
Rounds and Squares.—Bar Iron.

1 to 1½	1.50 Base.
2 to 2½	.20 extra.
3 to 3½	.50 "
3½ to 4	.80 "
4½ to 4½	1.00 "
4½ to 5	1.30 "
5½ to 6	1.80 "
5¾ to 6½	2.00 "

BABBITT METALS

All standard and special grades.
In sectional molds or bars.

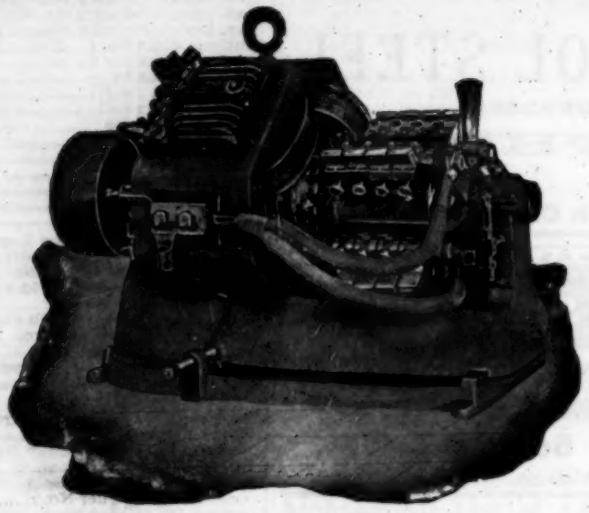
Phila. Chicago. **MERCHANT & CO., Inc.** New York. Brooklyn

Wrtte us for prices always. It will pay you.

Eddy Dynamo Electro-Plating Machines

— FOR —

BICYCLE PLATING PLANTS.



NORTHAMPTON EMERY WHEEL CO., 20 S. Canal St., Chicago, Ill.

EXCLUSIVE WESTERN SELLING AGENTS.

THE NEW FOX

Our No. 2 Hand Milling Machine.

Pilot Wheel Hand Miller,

Constructed on Generally Approved Lines,
but Distinctively Exclusive in its

PILOT WHEEL CARRIAGE FEED, Exceedingly Handy for a

Long Stroke, Quick Return,
and for Milling "Spots."

UNIVERSALLY ADJUSTABLE SPINDLE BOXES.
(Spindle may be kept in original alignment.)

We also have a new line of **SENSITIVE DRILLS**, 1 to 6 Spindle, and further, make **PUNCH PRESS SQUARING SHEARS, SHAPERS,** also **FOX UNIVERSAL TRIMMERS.**

313 N. Front St., Grand Rapids, Mich. **FOX MACHINE CO.**

THE 1898 EDITION OF THE Iron and Steel Directory

Published by
The American Iron and Steel Association.

Will be sent postpaid by *The Iron Trade Review* at $7. Ready now.

Is a thorough revision of the list of blast furnaces, rolling mills, Bessemer and Open-Hearth steel works, plate and sheet mills, nail mills, tin plate mills, malleable, cast iron pipe and wrought pipe works, car wheel and locomotive works, with many new lists of works in other lines.

6⅜ to 7¾	2.50 extra
¾ to ⅞	.10 "
⅞ to 11-16	.20 "
¾ to 9-16	.30 "
7-16 to 15-32	.40 "
⅜ to 13-32	.50 "
5-16 to 1-32	.70 "
¼ to 9-32	.90 "
7-32	1.40 "
3-16	2.50 "

Flats.—Bar Iron.

1¼ to 4 x ⅜ to 1	1.05 Base
4¼ o 6 x ⅜ to 1	.10 extra
6¼ o 8 x ⅜ to 1	.60 "
8¼ o 10 x ⅜ to 1	.80 "
1⅜ o 4 x 1 1-16 to 1½	.30 "
4¼ to 6 x 1 1-16 to 1½	.40 "
6¼ to 8 x 1 1-16 to 1½	.60 "
8¼ to 10 x 1 1-16 to 1½	.90 "
2 to 4 x 1⅝ to 2	.50 "
4¼ to 6 x 1⅝ to 2	.60 "
6¼ to 8 x 1⅝ to 2	.80 "
8¼ to 10 x 1⅝ to 2	1.00 "
2 to 4 x 2⅛ to 3	.60 "
4¼ to 6 x 2⅛ to 3	.80 "
6¼ to 8 x 2⅛ to 3	1.00 "
1⅜ to 1¾ x ⅜ to 1	.10 "
1 to 1 1-16 x ⅜ to ⅞	.20 "
¾ to 13-16 x ⅜ to ⅞	.40 "
⅝ to 11-16 x ⅜ to ⅞	.50 "
⅛ to 9-16 x ⅜ to ½	.90 "

Heavy Band Iron.

7 to 10 x ¼ to 5-16	.70 extra.
6¼ to 6¾ x ¼ to 5-16	.50 "
4¼ to 6 x ¼ to 5-16	.30 "
1⅜ to 4 x ¼ to 5-16	.20 "
1 to 1⅜ x ¼ to 5-16	.30
¾ to 15-16 x ¼ to 5-16	.50 "
⅝ to 11-16 x ¼ to 5-16	.80 "
½ to 9-16 x ¼ to 5-16	1.00 "
⅜ to 7-16 x ¼ to 5-16	1.50 "

Heavy bands, 7-32 in. thick 1-10 c. per lb. higher than ¼ to 5-16 thick. **Bevel Edge Shaft Iron** 1-10 higher than same size of Heavy Bands.

Light Band Iron.

7 to 8 x No. 9 to 3-16	.90 extra
7 to 8 x Nos. 10, 11 and 12	1.00 "
6¼ to 6¾ x No. 9 to 3-16	.70 "
6¼ to 6¾ x Nos. 10, 11 and 12	.80 "
4¼ to 6 x No. 9 to 3-16	.50 "
4¼ to 6 x Nos. 10, 11 and 12	.60 "
1¾ to 4 x No. 9 to 3-16	.40 "
1¾ to 4 x Nos. 10, 11 and 12	.50 "
1 to 1 3-16 x No. 9 to 3-16	.50 "
1 to 1 3-16 x Nos. 10, 11 and 12	.60 "
13-16 to ⅞ x No. 9 to 3-16	.60 "
13-16 to ⅞ x Nos. 10, 11 and 12	.70 "
11-16 to ¾ x No. 9 to 3-16	.80 "
11-16 to ¾ x Nos. 10, 11 and 12	.90 "
9-16 to ⅝ x No. 9 to 3-16	1.00 "
9-16 to ⅝ x Nos. 10, 11 and 12	1.10 "
7-16 to ½ x No. 9 to 3-16	1.30 "
7-16 to ½ x Nos. 10, 11 and 12	1.40 "
⅜ x No. 9 to 3-16	1.50 "
⅜ x Nos. 10, 11 and 12	1.60 "

Bevel Edge Box Iron.

Same as Light Bands, of same sizes.

Beaded Band Iron, 1¼ in. to 2 in.

Sand Band Iron, 1-10 c. above same sizes of Light Bands.

Oval Iron.

⅜ to 1⅜	.40 extra
½ to 13-16	.50 "
⅝ to 11-16	.60 "
⅛ to 9-16	.80 "
⅜ to 7-16	1.10 "
¼ to 9-16 x 3-16	1.00 "
⅛ to 11-16 x ⅛	1.20 "

Half Oval and Half Round.

2¼ to 3	.60 extra
⅞ to 2	.50 "
¾ to 13-16	.70 "
⅝ to 11-16	.90 "
½ to 9-16	1.20 "
⅜ to 7-16	2.50 "
5-16	3.50 "
¼	4.50 "

Half Ovals less than ¼ their width in thickness, extra price.

Horse Shoe Iron.

All sizes 1 c. extra.

Cutting ordinary bars to specified length, .20 to .30 extra, according to length and size.

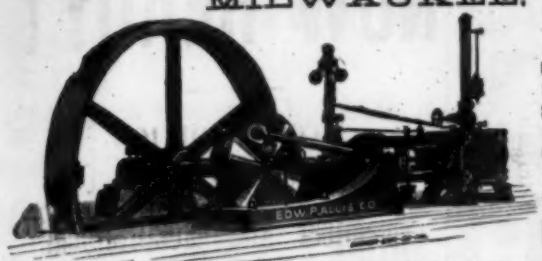
Steel Bands.

Width In Inches.	English Standard Gauge.		Extras.
1 1-2 to 6,	Nos. 7, 8, 9 or 3-16"	1.50	Base.
1¼ to 6,	" 10, 11, 12 or 14"	.05	per 100 lbs.
1 to 1¾,	" 7, 8, 9 or 3-16"	.10	"
1 to 1¾,	" 10, 11, 12 or 14"	.15	"
13-16 and ⅞,	" 7, 8, 9 or 3-16"	.20	"
13-16 and ⅞,	" 10, 11, 12 or 14"	.25	"
11-16 and ¾,	" 7, 8, 9 or 3-16"	.30	"
11-16 and ¾,	" 10, 11, 12 or 14"	.35	"
9-16 and ⅝,	" 7, 8, 9 or 3-16"	.40	"
9-16 and ⅝,	" 10, 11, 12 or 14"	.45	"
½,	Nos. 7, 8, 9 or 3-16"	.55	"
½,	" 10, 11, 12 or 14"	.60	"
7-16	" 7, 8, 9 or 3-16"	.75	"
7-16	" 10, 11, 12 or 14"	.85	"
⅜,	" 7, 8, 9 or 3-16"	.95	"
⅜,	" 10, 11, 12 or 14"	1.05	"

Iron and Steel Hoops.

Width Inches.	English Standard Gauge.		Extras.
7-16 to 3	Nos. 13, 14, 15 and 16	1.60	Base
7-16 to 2,	" 17, 18, and 19	.05	per 100 lbs
7-16 to 2,	" 20	.10	"
7-16 to 2,	" 21	.15	"
7-16 to 1¾,	" 22	.25	"
½ to 1¾,	" 13, 14 and 15	.05	"
½ to 1¾,	" 16, 17 and 18	.10	"

THE EDWARD P. ALLIS COMPANY
MILWAUKEE, WIS.



MANUFACTURERS OF

Blowing Engines, Hoisting Engines, Pumping Engines Air Compressors, Special Engines for Electric Lighting Street Railways and Rolling Mills. Ore Crushers, Crushing Rolls, Stamp Mills Concentraters, General Mining Milling and Smelting Machinery.

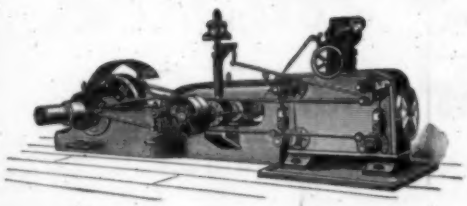
Reynolds Corliss Engines.

NEW YORK. CHICAGO. MINNEAPOLIS. DENVER. BUTTE. CITY OF MEXICO. SAN FRANCISCO. PITTSBURG

Southwark Foundry & Machine Co.
PHILADELPHIA, PA.

Porter-Allen Automatic Engines,
Blowing Engines, Centrifugal Pumps,
Weiss Counter-Current Condensers.

THE LANE & BODLEY CO.,
CINCINNATI, OHIO.



Engines,

ALL SIZES.

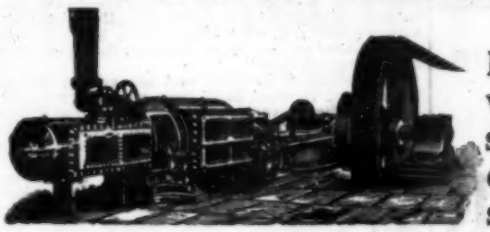
Simple and Compound.

Shafting, Hangers, Pullevs.

Belt Elevators, Saw Mills.

WILLIAM TOD & CO.
YOUNGSTOWN, OHIO.

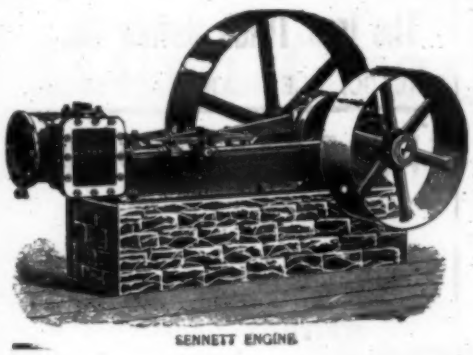
The Porter-Hamilton Engine



Reversing Engines, Blowing Engines, Converters, Hydraulic and special heavy machinery for the iron and steel trades.

Park Building, Pittsburg.

SEWARD S. BABBITT.



SENNETT ENGINE.

THE GEO. B. SENNETT CO.,
YOUNGSTOWN, OHIO,

MANUFACTURERS OF THE

Sennett Slide Valve Engine.

A well made and durable center crank engine of from 20 to 40 h. p. The design is thoroughly modern and all parts are made in duplicate Engines kept in stock ready to run. Catalogues or prices willingly furnished. Among our other specialties are the

Sennett Compressed Couplings.

(See advertisement next week.)

Foundry contracts solicited for Castings from 10 lbs. to 5 tons each.

The Iron Trade Review

Pays special attention to iron ore, blast furnace, rolling mill, foundry and machine shop interests. Per year $3.00.

1¼ to 1⅜,	"	19 and 20	per	100 lbs.
1¼ to 1⅜,	"	21	.20	"
1¼ to 1⅜,	"	22	.30	"
15-16 and 1,	"	13, 14 and 15		"
15-16 and 1,	"	16, 17 and 18	.15	"
15-16 and 1,	"	19 and 20	.20	"
15-16 and 1,	"	21	.25	"
15-16 and 1,	"	22	.35	"
⅞,	Nos. 13, 14 and 15		.20	"
⅞,	" 16, 17 and 18		.25	"
⅞,	" 19 and 20		.30	"
⅞,	" 21		.35	"
⅞,	" 22		.45	"
¾ and 13-16	Nos. 13, 14 and 15		.30	"
¾ and 13-16	" 16, 17 and 18		.35	"
¾ and 13-16	" 19 and 20		.40	"
¾ and 13-16	" 21		.45	"
¾ and 13-16	" 22		.50	"
¾ and 13-16	" 23		.60	"
11-16,	Nos. 13, 14 and 15		.35	"
11-16,	" 16, 17 and 18		.40	"
11-16,	" 19 and 20		.50	"
11-16,	" 21		.60	"
11-16,	" 22		.70	"
11-16,	" 23		.80	"
⅝,	Nos. 13, 14 and 15		.40	"
⅝,	" 16, 17 and 18		.45	"
⅝,	" 19 and 20		.55	"
⅝,	" 21		.65	"
⅝,	" 22		.75	"
⅝,	" 23		.85	"
9-16,	" 13, 14 and 15		.45	"
9-16,	" 16, 17 and 18		.50	"
9-16,	" 19 and 20		.60	"
9-16,	" 21		.70	"
9-16,	" 22		.80	"
9-16,	" 23		.90	"
½,	" 13, 14 and 15		.35	"
½,	" 16, 17 and 18		.60	"
½,	" 19 and 20		.70	"
½,	" 21		.80	"
½,	" 22		.90	"
½,	" 23		1.00	"
7-16,	" 13, 14 and 15		.80	"
7-16,	" 16, 17 and 18		.90	"
7-16,	" 19 and 20		1.00	"
3⅜,	" 13, 14 and 15		1.00	"
3⅜,	" 16, 17 and 18		1.10	"
3⅜,	" 19 and 20		1.20	"

Sheet Iron.

No. 10	2 25
No. 12	2 35
No. 14	2 30
No. 15-17	2 40
No. 18	2 50
No. 20	2 70
No. 22-24	2 70
No. 25-26	2 80
No. 27	2 90

Steel Boiler Plates—1-4 in. and Heavier.

Tank	2 25
Shell	2 40
Flange	2 60
Marine Flange	2 75
Fire Box	1c to 3½

Above includes plates 90 inches wide.

90 to 96 in. wide	1c. p. extra
96 to 100 in. wide	1½c. "
100 to 104 in. wide	2c. "
104 to 106 in. wide	special.

Burden Boiler Rivets.

½, ⅝, 11-16 and ¾ inches diameter	2 25
Bridge ½, ⅝, 11-16 and ¾ inch diam	2 60

Wrought Pipe and Boiler Tubes.

Merchant pipe, from store		dis. 60 and three 10s	
Boiler tubes, 1¼ to 1½ inch		Discount	45
" " 1¾ to 2½ inch	iron,	"	55
" " " "	steel,	"	60
" " 2¾ to 4 inch	iron,	"	60
" " " "	steel,	"	60⅔
Casing, screw and socket joint		"	50
Casing, inserted joint		"	45

Weddell House.
Cleveland, Ohio.

THE U.S. HOTEL CO.
C.A. SWAN & W.L. BATES
MANAGERS

50 ROOMS AT 2.00
50 ROOMS AT 2.50
75 ROOMS AT 3 TO 4.00

All Meals
50¢ Each

The Playford Mechanical Stoker

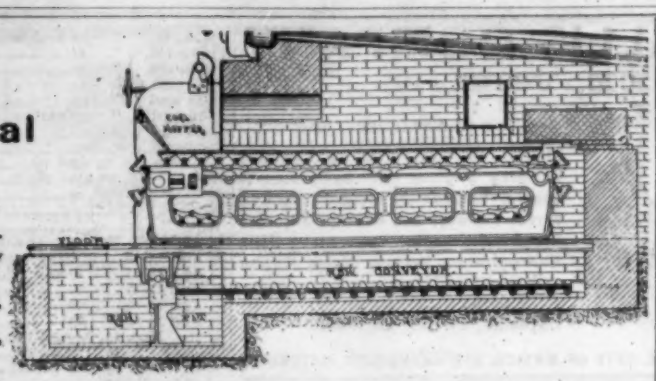
Guaranteed to Abolish smoke, to increase boiler capacity and to save fuel.

For information, address,

The Playford Stoker Co.

404 Telephone Bldg.,

CLEVELAND, OHIO.



IRON CLAD PAINT CO.

Factory, 75 & 77 Central Way. Sec. & Treas., No. 3 Case Build'g.

CLEVELAND, OHIO.

ORDER DIRECT FROM THE

Iron Clad Paint Co.

And get the genuine article, and save liability of suit for using an article made in violation of the patents issued to Wm. Green, and now owned by this Company.

IRON CLAD PAINT is the most durable, most fire-proof and Cheapest Paint made.

FURNISHED both Dry and Ground in Oil

USED BY NEARLY ALL THE RAILROADS.

We Claim The Following Merits for Jenkins Bros.' Valves

1. Manufactured of the best Steam Metal.
2. No regrinding, therefore not constantly wearing out the Seat of the Valves.
3. Contain JENKINS DISC, which is suitable for all Pressures of Steam, Oil and Acids.
4. The Easiest Repaired, and all parts Interchangeable.
5. Every Valve Tested before leaving the factory.
6. ALL GENUINE stamped with Trade Mark,

(2)

JENKINS BROTHERS, NEW YORK, PHILADELPHIA, CHICAGO, BOSTON.

DIXON'S SILICA GRAPHITE PAINT

FOR TIN OR SHINGLE ROOFS AND IRON WORK. IT IS ABSOLUTELY WITHOUT AN EQUAL.

Tin roofs well painted have not required repainting for 10 to 15 years

If you need any paint it will pay you to send for circular.

JOSEPH DIXON CRUCIBLE CO., Jersey City, N. J.

FOR GREAT TENSILE STRENGTH, ELASTICITY AND ELONGATION, COUPLED WITH UNUSUAL NON-CORROSIVE QUALITIES,

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EXTRACT FROM PREFACE:

In the preparation of the second edition of our Handbook, the general plan of the first edition has been followed, viz., to present in concise form such data and information as are useful to the chemist and metallurgist. Several tables of the first edition, which were of somewhat limited use, have been omitted, while more than one hundred pages of new matter have been added.

The methods for analysis of iron ore, iron and steel and for assaying have been given briefly, but perhaps as much in detail as is consistent with the general scope of the book. Several changes and additions to the Specific Gravity tables have been made by adoption of later and more accurate values.

In the notes on blast furnace practice have been outlined the more important theoretical and practical points, which, it is hoped, will be of some service to those interested in the manufacture of iron.

The hygrometric table gives the necessary information for determining the amount of moisture in air, a subject whose importance in metallurgical operations is being more fully recognised at present than heretofore. This table is new and is based on the most accurate data available at the present time.

The tables of weights and measures, United States and foreign, have been very much amplified, and the conversion tables for United States and metric weight and measures of the U. S. Coast and Geodetic Survey included, the latter being based on the legal standard for this country.

Numerous miscellaneous tables have been added, which, it is hoped, will be found of value

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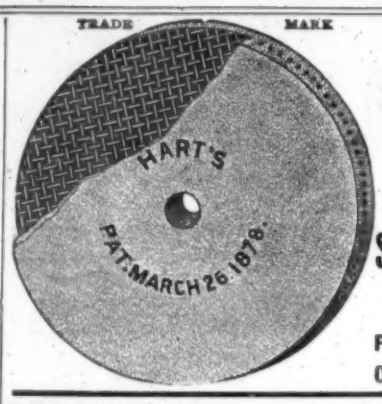

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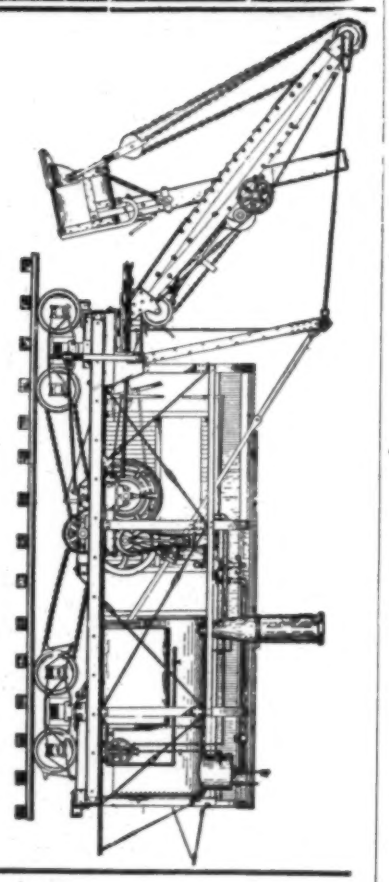

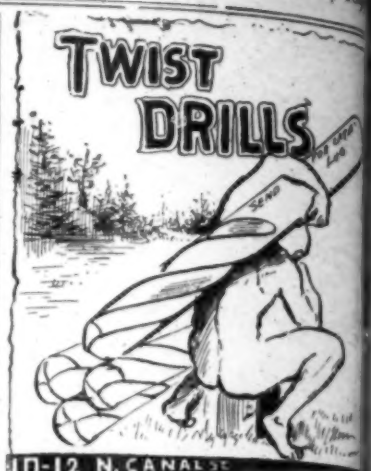

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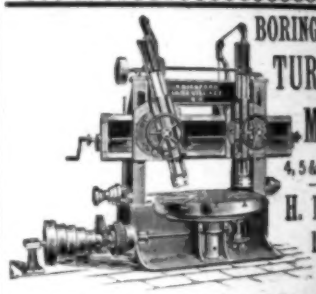

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